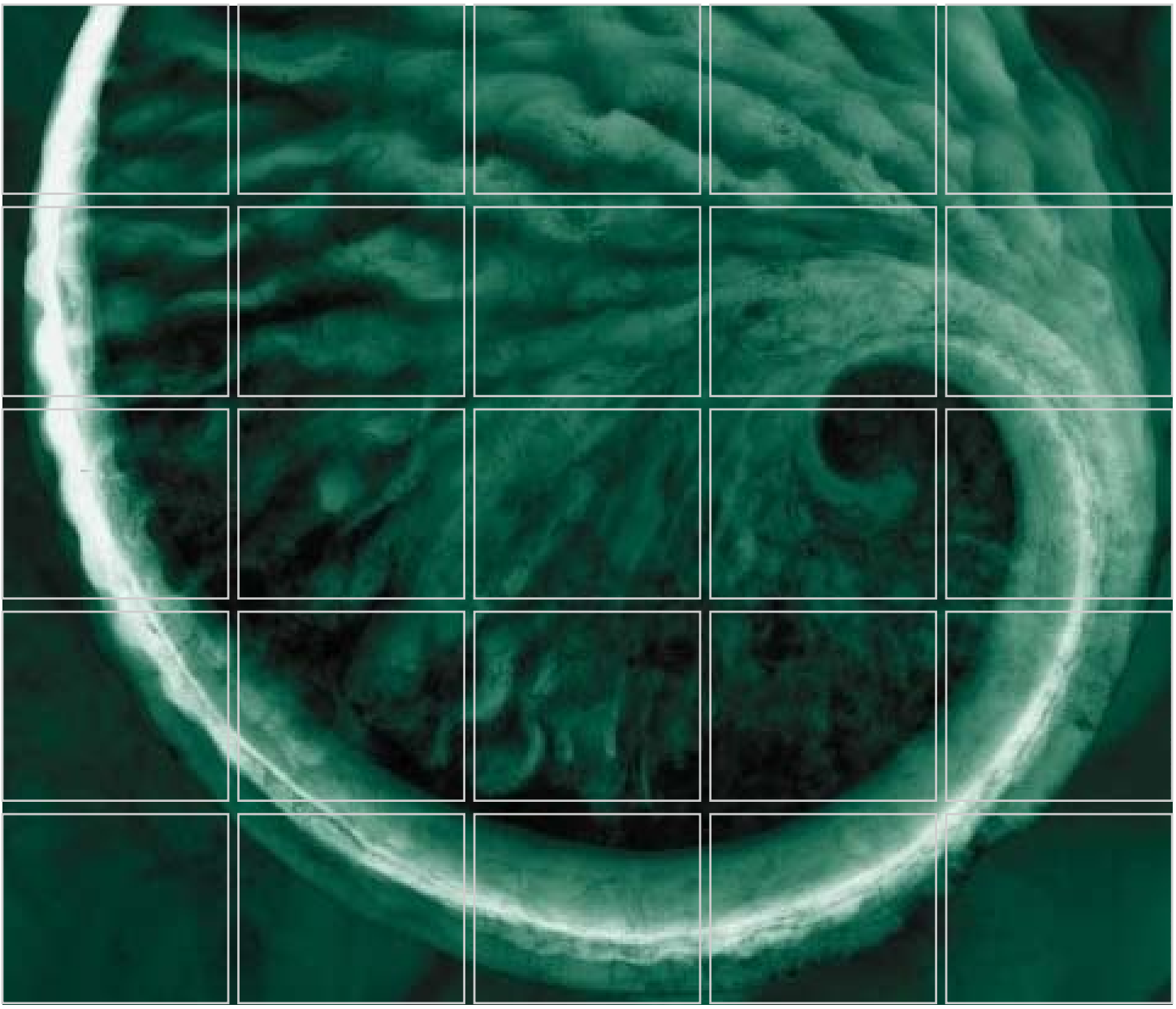

Site Closure Request

Sites 2, 3, 5, 12, 13, and 14
152nd Airlift Wing, ANG Base
Reno, Nevada

November 2003

Presented to
Air National Guard

Delivering sustainable solutions in a more competitive world

ERM

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1.0 INTRODUCTION

On behalf of the Air National Guard (ANG), Environmental Resources Management-West, Inc., (ERM) has prepared this closure request report for Environment Restoration Program (ERP) Sites 2, 3, 5, 12, 13, and 14 at the 152nd Airlift Wing, ANG Base in Reno, Nevada (Figure 1-1). This work has been completed in accordance with General Services Administration (GSA) Order No. 9T1N085PG-02, a contract between the ANG and ERM.

The results of several phases of investigation indicated that the environment conditions at Sites 2, 3, 5, 12, 13, and 14 do not warrant additional action. The investigations included:

- A preliminary assessment performed in 1989 by Automated Sciences Group (ASG);
- A site assessment performed in 1991 by PEER Consultants (PEER);
- A site investigation performed in 1992 and 1993 by Oak Ridge National Laboratory (ORNL);
- A remedial investigation (RI), for selected sites, performed in 1996 by ERM; and
- An ongoing, base-wide groundwater monitoring program, initiated in 1992.

ERM is currently performing groundwater monitoring activities. The most recent potentiometric surface map is shown on Figure 1-2 for reference.

During a project review meeting in June 2002, the ANG, the Nevada Department of Environmental Protection (NDEP), and ERM discussed the status of Sites 2, 3, 5, 12, 13, and 14. It was agreed that minimal contamination exists at these sites, and site closure may be appropriate. Subsequent to this meeting, the ANG submitted a *Draft-Final Closure Request* (ERM, August 2002) to the NDEP. In a letter dated 6 November 2002, the NDEP requested that additional site information be included in the closure request report. This iteration of the closure request has been revised to include all available site information pertinent to the soil and/or groundwater investigation at the ERP sites.

The site information is presented separately in the remainder of this report. The discussion for each site includes:

- Background and Description;
- Investigation Activities Performed;
- Investigation Results;
- Status; and
- Rationale for Closure.

References and supporting figures and tables are included at the end of this report.

2.0 SITE 2

2.1 BACKGROUND AND DESCRIPTION

Site 2 is a former fire training area (FTA) located east of Building 1. The FTA consisted of an unlined, slightly bermed, open earthen area with a depth of 12 to 18 inches. Jet fuel (JP-4), spent solvents, waste oils, and other flammable liquids were the primary materials burned during the training exercises. In addition, a water base was applied to the FTA prior to each burning exercise. It is estimated that approximately 1,800 gallons of flammable liquids may have been used at this site during the 4-year period this FTA was in use (ASG, 1989).

2.2 INVESTIGATION ACTIVITIES PERFORMED

ASG conducted a preliminary assessment of Site 2 in 1989. This preliminary assessment concluded that the former uses of the site warranted further investigation. A site investigation was subsequently conducted by ORNL in 1992. The objective of the site investigation was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The site investigation consisted of:

- **Groundwater Screening Survey –** HydroPunch groundwater samples were collected from 15 locations within 200 feet by 250 feet area overlying Site 2 (Figure 2-1). Headspace analysis of groundwater screening samples was performed using a field gas chromatograph
- **Installation of Piezometers –** Three piezometers were installed at the site, and groundwater level measurements were collected to determine the optimum placement of monitoring wells (Figure 2-1).
- **Soil Sampling** - Three soil borings were installed at the site using a hollow-stem auger drill rig (Figure 2-2). Eight soil samples were collected from the three borings at depths up to 7 feet. All soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals.
- **Groundwater Sampling** - Three monitoring wells (MW-08, -09, and -11) were installed at the site (Figure 2-2), and groundwater monitoring activities were initially conducted in December 1992 and March 1993. Samples collected during these two events were analyzed

for VOCs, SVOCs, TPH, and metals. Subsequently, Monitoring Well MW-08, which had been sampled for VOCs and SVOCs since 1995, was covered by the extension of the aircraft ramps 1998. A replacement well, MW-08R, was installed in 1999. Because SVOC concentrations have decreased to non detect in MW-08R, these compounds were deleted from the monitoring program in 2001. In addition, beginning in March 2002, four rounds of groundwater sampling was conducted at MW-11. Samples from theses events were analyzed for VOCs and methyl-tert-butyl ether (MTBE) and were intended to provide additional site data in support of closure consideration.

2.3 INVESTIGATION RESULTS

Groundwater Screening Survey - The groundwater screening survey results are summarized in Table 2-1. As shown on Table 2-1, seven of the 15 screening samples displayed a positive result, thus suggesting the presence of VOCs and fuel-related compounds in groundwater.

Groundwater Level Measurements – Groundwater level measurements collected from the three piezometers in December 1992 and March 1993 indicated that the local groundwater flow direction was towards the southeast, which is similar to the flow direction observed during routine base-wide groundwater monitoring activities.

Soil Sampling – Soil analytical data (detections only) are summarized in Table 2-2. A number of organic compounds, including VOCs, SVOCs, and TPH were detected in soil samples collected at Site 2; however, all detected concentrations were significantly lower than the established cleanup goals for the individual compounds.

VOCs detected in soil included:

- Chloroform which was detected in six samples at concentrations ranging from 1 to 2 micrograms per kilogram (µg/kg);
- 2-Butanone was detected in three samples at concentrations ranging between 9 to 4,440 µg/kg;
- 1,2-Dichlorethene (1,2-DCE) was detected in three samples at concentrations ranging between 8 to 200 µg/kg;
- Ethylbenzene was detected in two samples at concentrations ranging between 12 and 17 µg/kg; and

- Xylenes were detected in one sample at a concentration of 13 μg/kg.

SVOCs detected in soil include:

- Bis(2-ethylhexyl) phthalate was detected in all eight soil samples at concentrations ranging from 40 to 120 μg/kg;
- 2-Methylnapthalene was detected in two samples at concentrations ranging from 84 to 91 μg/kg; and
- Naphthalene was detected in two samples at concentrations ranging from 52 to 110 μg/kg.

TPH was detected in six soil samples at concentrations ranging from 0.17 to 84.69 milligrams per kilogram (mg/kg). These detections were also below the site cleanup level established for TPH.

Inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at Site 2; however, these detections were consistently within the background ranges detected at the base and not indicative of typical metals contamination.

Groundwater Sampling – Groundwater analytical data collected to date are summarized in Table 2-3.

A number of organic and inorganic compounds were detected in all three wells during the December 1992 and March 1993 sampling events. The detected inorganic concentrations were typically within the range of naturally occurring concentrations or significantly below established cleanup levels. For this reason, inorganic analysis of groundwater samples was discontinued for Site 2. Similar, the detected SVOC concentrations were marginally above detection limits and well below cleanup levels. SVOCs were also deleted from the groundwater monitoring program.

VOCs, including trichloroethene (TCE), 1,2-DCE, cis-1,2-dichloroethene (c-1,2-DCE), trans-1,2-dichloroethene (t-1,2-DCE), benzene, toluene, and MTBE, were the only compounds detected with some frequency in groundwater at the site; however, the detected concentrations were less than established cleanup levels. The only exception is a TCE detection (6 μg/l) in MW-08 in December 1992. TCE has only been detected in this well at concentrations marginally above the detection limit or not detected at all since December 1992. MTBE has been detected consistently in wells

MW-08 and MW-11; however, it has been demonstrated that no sources of MTBE exist at the ANG Base. The detected concentrations are likely related to an ongoing MTBE remediation project upgradient of the ANG Base.

2.4 SITE STATUS

Since no significant impacts to soil or groundwater were identified at Site 2, no other investigation or remediation activities have been performed. Site 2 has been covered with concrete and is now part of the aircraft-parking apron and, due to its proximity, was incorporated into the site investigation of Site 12 (Aircraft Parking Apron Area). Two of the three monitoring wells present at Site 2 (MW-08R and MW-11) are currently being monitored for VOCs to assess Site 2 for closure. In addition, both wells are currently monitored for VOCs and MTBE as part of the base-wide, groundwater monitoring program.

2.5 RATIONALE FOR CLOSURE

Based on results from the site investigation and current groundwater monitoring data, the ANG is requesting closure for Site 2 for the following reasons:

- Only minor impacts to soil exist at the site. Results of the site investigation indicate VOCs and SVOCs are present in soil at concentrations below soil remediation criteria established for the site. Several inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at the site, however, the detected concentrations were within the ranging of naturally occurring conditions (i.e., within local background ranges).
- Groundwater impacts are minimal at the site. C-1,2-DCE and t-1,2-DCE continue to be detected at the site, however all concentrations have been below regulatory limits for these compounds (70 and 100 µg/l, respectively). Additionally, no SVOC compounds have been detected in groundwater at the site since May 2000.

3.0 SITE 3

3.1 BACKGROUND AND DESCRIPTION

Site 3 is a former FTA adjacent to the north gate of the ANG Base. The FTA consisted of an unlined, slightly bermed, open earthen area with a depth of approximately 12 inches. Jet fuel (JP-4), spent solvents, waste oils, and other flammable liquids were the primary materials burned during the training exercises. In addition, a water base was typically applied to the FTA prior to burning exercises. It is estimated that approximately 6,300 gallons of flammable liquids may have been used at this site between 1964 and 1971 (ASG, 1989).

3.2 INVESTIGATION ACTIVITIES PERFORMED

A preliminary assessment of Site 3, conducted by ASG in 1989, indicated that the former uses of the site warranted further investigation. A subsequent site investigation was conducted by ORNL in 1992. The objective of the site investigation was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The investigation consisted of:

- **Groundwater Screening Survey –** HydroPunch groundwater samples were collected from 21 locations within 200 feet by 200 feet area overlying Site 3 (Figure 3-1). Headspace analysis of groundwater screening samples was performed using a field gas chromatograph
- **Installation of Piezometers –** Four piezometers (Figure 3-1) were installed at the site, and groundwater level measurements were collected to determine the optimum placement of monitoring wells.
- **Soil Sampling** - Five soil borings were installed at the site using a hollow-stem auger drill rig (Figure 3-2). Twelve soil samples were collected from the five boring at depths up to 10 feet. All soil samples were analyzed for VOCs, SVOCs, TPH, and metals.

- **Groundwater Monitoring** - Three monitoring wells were installed at the site (Figure 3-2), and groundwater sampling activities were initially conducted in December 1992 and March 1993. Samples collected during these two events were analyzed for VOCs, SVOCs, TPH, and metals. Since March 2002, four rounds of groundwater sampling have been collected from Well MW-22 as part of the base-wide, groundwater monitoring program. Samples from the last four events were analyzed for VOCs and MTBE

3.3 INVESTIGATION RESULTS

Groundwater Screening Survey - The groundwater screening survey results are summarized in Table 3-1. As shown on Table 3-1, five of the 21 screening samples displayed a positive result, suggesting the presence of VOCs and fuel-related compounds in groundwater at Site 3.

Groundwater Level Measurements – Groundwater level measurements collected from the piezometers in December 1992 and March 1993 indicated that the local groundwater flow direction varied between east and southeast, which is similar to the flow direction observed during subsequent base-wide groundwater monitoring activities.

Soil Sampling – Soil analytical data (detections only) are summarized in Table 3-2. Chloroform, at concentrations ranging from 1 to 2 µg/kg, was present in three of the six soil samples collected, and was the only VOC detected. This detected concentration is three orders of magnitude lower than the cleanup level. In addition, the SVOC bis(2 ethylhexyl) phthalate was detected in three soil samples at Site 3. These detections were also below the cleanup level established for the site for this compound. Several inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at Site 3, however, these detections were all within the background ranges detected at the base.

Groundwater Sampling – Groundwater analytical data collected during the site investigation in 1992 and 1993 is summarized in Table 3-3.

Toluene, diethyl phthalate, and di-n-octyl phthalate were each detected once in groundwater samples collected from Site 3. All three detections were marginally above the method detection limit, and two to three orders of magnitude lower than the cleanup level.

Inorganic compounds were also detected in groundwater at Site 3; however, the detected concentrations were all within the range of naturally occurring conditions or significantly less than the cleanup levels, with the exception of manganese in wells MW-20 and MW-22.

3.4 SITE STATUS

Since no significant impacts to soil or groundwater were identified at Site 3, no other investigation or remediation activities have been performed since the site investigation in 1992 and 1993. Most of Site 3 is currently paved and is being used as a parking lot for the Airport Authority of Washoe County (AAWC). The status of two of the monitoring wells installed at the site (MW-20 and –21) is unknown. However, the remaining well, MW-22, is currently being monitored for VOCs and MTBE as part of the base-wide groundwater monitoring program.

3.5 RATIONALE FOR CLOSURE

Based on results from the site investigation and current groundwater monitoring data, the ANG is requesting closure for Site 3 for the following reasons:

- Only minor impacts to soil exist at the site. Chloroform was the only VOC detected in soil samples and was below the cleanup level established for the site. Several other compounds, including bis(2-ethylhexyl) phthalate, aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected at the site; however, the detected concentrations were within the ranging of naturally occurring conditions (i.e., within local background ranges).
- Groundwater impacts are minimal at the site. Several compounds have been sporadically detected at the site, but all detected concentrations were below remediation criteria established for the site. Furthermore, the most recent groundwater analytical data indicate that no compounds are currently present in site groundwater at concentrations above the method detection limit.

4.0 SITE 5

4.1 BACKGROUND AND DESCRIPTION

Site 5 is a former FTA located near Building 76. The FTA consisted of an unlined, bermed, open earthen area. Jet fuel (JP-4), spent solvents, waste oils, and other flammable liquids were the primary materials burned during the training exercises. In addition, a water base was applied to the FTA prior to all burning exercises. It is estimated that approximately 3,200 gallons of flammable liquids may have been used at this site between 1970 and 1977 (ASG, 1989).

4.2 INVESTIGATION ACTIVITIES PERFORMED

A preliminary assessment of Site 5, conducted by ASG in 1989, indicated that the former uses of the site warranted further investigation of the area. A subsequent site investigation was conducted by ORNL in 1992. The objective of the site investigation was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The investigation consisted of:

- **Groundwater Screening Survey –** HydroPunch groundwater samples were collected from 19 locations within a 125 feet by 125 feet area overlying Site 5 (Figure 4-1). Headspace analysis of groundwater screening samples was performed using a field gas chromatograph.
- **Installation of Piezometers –** Three piezometers (Figure 4-1) were installed at the site, and groundwater level measurements were collected to determine the optimum placement of monitoring wells.
- **Soil Sampling** - Five soil borings were installed at the site using a hollow-stem auger drill rig (Figure 4-2). Twelve soil samples were collected from the five boring at depths up to 10 feet. All soil samples were analyzed for VOCs, SVOCs, TPH, and metals.
- **Groundwater Monitoring** - Three monitoring wells (MW-16, -17, and -19) were installed at the site (Figure 4-2), and groundwater sampling activities were conducted in December 1992 and March 1993. Samples collected during these two events were analyzed for VOCs, SVOCs, TPH, and metals.

An RI was performed by ERM in 1995 to further characterize the nature and extent of impacts identified at Site 5 during the site investigation completed in 1992 and 1993. This investigation consisted of:

- **Groundwater and Soil Screening Survey –** Soil and groundwater samples were screened using a field gas chromatograph to select samples for laboratory submittal.
- **Soil Sampling –** Four additional soil borings were installed using a hollow-stem auger drill rig (Figures 4-2). Thirteen soil samples were collected from the four borings at depths up to 10 feet. All soil samples were analyzed for VOCs, SVOCs, and TPH.
- **Groundwater Monitoring** - Two additional monitoring wells (MW-30 and –32) were installed at the site (Figure 4-2). Samples collected during the RI groundwater sampling events were analyzed for VOCs, SVOCs, TPH, and lead. Recently, the analytical suite was reduced to simply VOCs.

4.3 INVESTIGATION RESULTS

The site investigation and RI results are presented separately below.

4.3.1 Site Investigation Results

Groundwater Screening Survey - The groundwater screening survey results are summarized in Table 4-1. As shown on Table 4-1, six of the 19 screening samples displayed a positive result, thus indicating the presence of chlorinated and/or fuel-related compounds in groundwater.

Groundwater Level Measurements – Groundwater level measurements collected from the three piezometers in December 1992 and March 1993 indicated that the local groundwater flow direction was towards the southeast, which is similar to the typical base-wide flow direction observed since 1995.

Soil Sampling – Soil analytical data are summarized in Table 4-2. Total VOCs and total SVOCs detected in soil samples during the site investigation are also shown on Figure 4-3. Several VOCs were detected

in five soil samples at Site 5 with the majority of detections observed in soil boring BH06. These compounds included:

- Chloroform was detected in two samples at concentrations of 1 to 2 µg/kg;
- Acetone was detected in three samples at concentrations ranging between 12 to 1,900 µg /kg;
- Methylene chloride was detected in one sample at a concentration of 4,200 µg /kg;
- Ethylbenzene was detected in one sample at a concentration of 1,800 µg/kg; and
- Xylenes were detected in one sample at a concentration of 9,700 µg/kg.

Only the detection of methylene chloride, in soil boring BH06, exceeded the cleanup level established for this compound for the site.

SVOCs were detected in eleven soil samples collected at Site 5. Similar to the VOC detections, the majority of the elevated concentrations were observed in soil boring BH06. However, no SVOCs were detected at concentrations exceeding the cleanup levels.

TPH was detected in five soil samples ranging from 0.02 to 2,166.45 mg/kg. Similar to VOCs, the only detection of TPH that exceeded the cleanup level established for the site was observed in soil boring BH06. TPH detections are also shown on Figure 4-4.

Several inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at Site 5; however, these detections were within the background ranges for soil conditions at the base.

Groundwater Sampling – Groundwater analytical data collected during the site investigation is summarized in Table 4-3.

Several VOCs and SVOCs were detected in groundwater samples collected during the site investigation in 1992 and 1993. Most notably, benzene was detected in well MW-17 at 15 µg/l in March 1993. All other detections of organic compounds were significantly below their respective cleanup levels.

In general, inorganic compounds were detected within background levels observed for the ANG Base. Manganese, however, appears to be present at concentrations slightly higher than the background range in wells MW-16 and MW-17.

4.3.2 Remedial Investigation Results

Groundwater and Soil Field Screening Survey – The results of the field screening of soil and groundwater samples generally correlated with the results of the laboratory analysis.

Soil Sampling – Soil analytical data are summarized in Table 4-4. Total VOCs and total SVOCs detected in soil samples during the site investigation is also shown on Figure 4-3. Several VOCs were detected in eight soil samples at Site 5 during the RI; however, no compound exceeded the cleanup levels established for the base. The detected compounds included:

- Acetone was detected in eight samples at concentrations ranging between 13 to 277 µg/kg;
- 4-methyl-2-pentanone was detected in one sample at a concentration of 41 µg/kg;
- Ethylbenzene was detected in one sample at a concentration of 211 µg/kg;
- Toluene was detected in one sample at a concentration of 255 µg/kg; and
- Total Xylenes were detected in two samples at concentrations of 15 and 2,040 µg/kg.

TPH was detected in two samples at concentrations of 12.5 and 288 mg/kg (Figure 4-4 and Table 4-5). Both detections were observed in the samples collected from soil boring SB5, however only the 2 foot sample exceeded the established cleanup level for TPH.

Groundwater Sampling – Additional groundwater analytical data collected since the site investigation are summarized in Table 4-3. As shown in Table 4-3, benzene is the only compound detected during the RI and subsequent groundwater monitoring that exceeded the cleanup level. Benzene concentrations were detected at concentrations of 11 and 14 µg/l during the RI, but has since degraded to non-detect levels. In fact, benzene has not been detected at Site 5 since September 1999.

4.3.3 Remediation Activities

Soil remediation was performed at Site 5 in 1997. Approximately 25 tons of potentially impacted soil were removed from the site and transported to an off-site facility for treatment and disposal. Source area monitoring Well MW –17 was abandoned during these removal actions. A replacement well, MW-17R, was installed in the vicinity of MW-17 after backfilling operations were completed.

4.4 SITE STATUS

Site 5 was paved over by the AAWC in 1998 for use as a parking lot, which resulted in the loss of Monitoring Wells MW-17R and MW-32. Subsequently, a replacement well, MW-17R2, was installed in 1999 and is currently being monitored for VOCs and MTBE as part of the base-wide groundwater monitoring program. Monitoring Wells MW-16 and MW-19 have not been located since 1995. Therefore, it is probable that the wells have been paved over, due to AAWC and ANG construction activities.

4.5 RATIONALE FOR CLOSURE

Based on results from the site investigation and current groundwater monitoring data, the ANG is requesting closure for Site 5 for the following reasons:

- Only minor impacts to soil exist at the site. Results of the site investigation and RI indicate that VOC, SVOC, and TPH compounds were detected in soil at the site. However, the impacted soil (in the vicinity of BH06) was removed during remediation activities completed in 1997. Several other compounds, including bis (2-ethylhexyl) phthalate, aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected at the site, but the detected concentrations were within the ranging of naturally occurring conditions (i.e., within local background ranges).
- Groundwater impacts are minimal at the site. Several compounds have been sporadically detected in groundwater, but all detected concentrations have decreased below established cleanup levels following soil removal at the site. Furthermore, the most recent groundwater analytical data indicates that no compounds are currently present in site groundwater at concentrations above the method detection limit.

5.0 SITE 12

5.1 BACKGROUND AND DESCRIPTION

ERP Site 12 is a former JP-4 spill area on the concrete-paved aircraft-parking apron. The site is an open area located approximately 360 feet from the northeast corner of Building 9, and approximately 280 feet from the northeast corner of Building 12. According to base personnel, an undocumented JP-4 spill occurred in the area in the 1970s and an estimated 40 gallons were released in 1986

5.2 INVESTIGATION ACTIVITIES PERFORMED

A site assessment of Site 12 was conducted by Peer Consultants in 1991. The objective of the site assessment was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The assessment consisted of:

- **Soil Sampling** - Three soil borings were installed at the site using a hollow-stem auger drill rig (Figure 5-1). Fourteen soil samples were collected from the three borings at depths up to 11 feet. All soil samples were analyzed for TPH and benzene, toluene, ethylbenzene, and xylene (BTEX) compounds.
- **Groundwater Sampling** - Three monitoring wells were installed at the site (Figure 5-1), and groundwater samples were collected in October 1991. Samples collected during this event were analyzed for TPH and BTEX compounds.

5.3 INVESTIGATION RESULTS

Soil Sampling – Soil analytical data are summarized in Table 5-1. Organic compounds detected in soil were:

- TPH was detected in six samples at concentrations ranging from 76 to 2,800 mg/kg. The cleanup level for this compound was either equal to or exceeded in five samples collected from MW01 and MW02.
- Benzene was detected in one sample at a concentration of 0.62 mg/kg, which exceeded the cleanup level for this compound.

- Ethylbenzene was detected in four samples at concentrations ranging from 0.02 to 6.7 mg/kg; and
- Xylenes were detected in four samples at concentrations ranging from 0.057 to 11.0 mg/kg.

Groundwater Level Measurements – Groundwater level measurements collected from the three monitoring wells in October 1991 indicated that the local groundwater flow direction was towards the southeast, which is similar to the flow direction observed since 1995, during subsequent base-wide groundwater monitoring activities.

Groundwater Sampling – Groundwater analytical results are summarized in Table 5-2. Ethylbenzene and xylenes were the only two compounds detected in groundwater samples collected in 1991. All detected concentrations were two to three orders of magnitude lower than the cleanup level or maximum contaminant level (MCL).

5.4 SITE STATUS

The site is currently covered by concrete and is part of the aircraft parking apron. Peer Consultants concluded that no further investigation of the soil and groundwater at Site 12 was warranted. No additional investigation or remediation activities have been performed to date. The status of the three monitoring wells installed at the site is unknown; however, abandonment of the wells was recommended in the site assessment report.

5.5 RATIONALE FOR CLOSURE

Based on results from the site assessment, the ANG is requesting closure for Site 12 for the following reasons:

- Results from the site assessment indicated that near surface soils in the south-facing portion of the site are impacted by petroleum compounds. However, since the site is capped with concrete, the potential for additional impaction to soil and groundwater is minimal.
- Groundwater impacts are minimal at the site. Only low levels of ethylbenzene (up to 2.0 µg/l) and xylenes (up to 4.0 µg/l) were detected at the site in 1991. By now, these low concentrations likely have degraded to non-detect levels.

6.0 SITE 13

6.1 BACKGROUND AND DESCRIPTION

Site 13 was identified by base personnel as a former spill area and possible waste-oil disposal area. The site includes two storm drains northeast of the Aerospace Ground Equipment (AGE) storage area, which is east of Building 2. Both drains are connected to a larger storm drain east of Building 82. The first drain was used as a vehicle wash area between 1966 and 1986. The second drain received runoff from the AGE storage area for more than 20 years. In addition, small quantities of oil (5 gallons or less) were occasionally spilled into the soil surrounding the second drain. No estimate is available to assess the volume of oil, grease, or hydraulic fluid that may have been washed into the drains. Both drains have not been used for waste disposal or vehicle washing since 1986 (ORNL, 1994).

6.2 INVESTIGATION ACTIVITIES PERFORMED

A site investigation was conducted by ORNL in 1992. The objective of the site investigation was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The investigation consisted of:

- **Groundwater Screening Survey –** HydroPunch groundwater samples were collected from 26 locations within a 125 feet by 225 feet area overlying Site 13 (Figure 6-1). Headspace analysis of groundwater screening samples was performed using a field gas chromatograph
- **Water Level Measurement –** Due to the proximity of Site 13 to Sites 2 and 5, piezometers installed at Sites 2 and 5 were utilized to determine the optimum placement of monitoring wells at Site 13.
- **Soil Sampling** - Five soil borings were installed at the site using a hollow-stem auger drill rig (Figure 6-2). Twelve soil samples were collected from the five borings at depths up to 8 feet. All soil samples were analyzed for VOCs, SVOCs, TPH, and metals.
- **Groundwater Sampling** - Three monitoring wells were installed at the site (Figure 6-2), and groundwater samples were collected in December 1992 and March 1993. Samples collected during these two events were analyzed for VOCs, SVOCs, TPH, and metals.

6.3 INVESTIGATION RESULTS

Groundwater Screening Survey - The groundwater screening survey results are summarized in Table 6-1. As shown, twelve of the 26 screening samples displayed a positive result, indicating the presence of chlorinated and fuel-related compounds in groundwater.

Groundwater Level Measurements – Groundwater level measurements collected from the piezometers and monitoring wells in December 1992 and March 1993 indicated that the local groundwater flow direction was towards the southeast, which is similar to the flow direction observed over the past 10 years.

Soil Sampling – Soil analytical data are summarized in Table 6-2. Low levels of VOCs, including 2-butanone and chloroform, were detected in three soil samples; however, the detected concentrations were three to four orders of magnitude below cleanup levels. SVOCs were also detected in soil samples. Bis(2-ethylhexyl) phthalate was detected in three of the five boring locations at concentrations ranging from 62 to 220 µg/kg; all detected concentrations were below the site cleanup level of 600 µg/kg. A number of SVOCs were detected in one shallow soil sample collected at boring BH19 (2 ft). All detected concentrations were less than the site cleanup levels. These compounds included:

- Benzo(a) anthracene at a concentration of 88 µg/kg;
- Benzo (a) pyrene at a concentration of 70 µg/kg;
- Benzo (b) fluoranthene at a concentration of 140 µg/kg;
- Benzo(k)fluoranthene at a concentration of 140 µg/kg;
- Chrysene at a concentration of 75 µg/kg;
- Flouranthene at a concentration of 160 µg/kg;
- Phenanthrene at a concentration of 65 µg/kg; and
- Pyrene at a concentration of 130 µg/kg.

TPH was detected in four samples at concentrations ranging from 0.21 to 39 mg/kg, significantly less than the cleanup level of 210 µg/kg.

Several inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at Site 13; however, these detections were within the background ranges detected at the base.

Groundwater Sampling – Groundwater analytical data collected during the site investigation is presented in Table 6-3. Several organic compounds were detected at low concentrations in all three wells during December 1992 and March 1993. These compounds included:

- Carbon disulfide was detected in two samples at concentrations of 14 and 1 μg/l;
- Bis(2-ethylhexyl) phthalate was detected in two samples at concentrations of 1 and 2 μg /l;
- Butylbenzyl phthalate was detected in two samples at concentrations of 1 and 2 μg /l;
- Diethhyl phthalate was detected in one sample at a concentration of 1 μg/l; and
- TPH was detected in one sample at a concentration of 0.02 mg/l.

Metals were also detected in groundwater at Site 13. All detected concentrations are within the background ranges established for the local groundwater and were not above site cleanup levels.

6.4 SITE STATUS

Since no significant impacts to soil or groundwater were identified at Site 13, no other investigation or remediation activities have been performed since the site investigation in 1992 and 1993. The ground surface at Site 13 was repaved in 1995, which resulted in the loss of Monitoring Well MW-14. The site now acts as a storage area for AGE materials. Currently, only water levels are being collected from the two remaining wells at the site.

6.5 RATIONALE FOR CLOSURE

Based on results of the site investigation, the ANG is requesting closure for Site 13 for the following reasons:

- Only minor impacts to soil exist at the site. Results of the site investigation indicate low levels of TPH are present in soil in the area north and east of the site. All organic compounds detected at the site are well below the site cleanup goals. Several inorganic compounds, including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc were also detected in soil at the site, however, the

detected concentrations were within the ranging of naturally occurring conditions (i.e., within local background ranges).

- Groundwater impacts are minimal at the site. Carbon disulfide, a common laboratory contaminant, was detected intermittently at low levels, suggesting laboratory interference with the groundwater samples. The presence of low-level SVOCs were also detected in groundwater at the site, however these detections were below site cleanup levels.

7.0 SITE 14

7.1 BACKGROUND

ERP Site 14 was identified by base personnel as a former spill area adjacent to Building 82. The spill occurred in May 1991 when a 1,000-gallon oil/water separator exceeded its holding capacity and overflowed onto unprotected soil on the southeast corner of Building 82. The primary material that overflowed was identified as JP-4 fuel. Base personnel estimated approximately 1,600 gallons of JP-4 may have reached the soil (ORNL, 1994).

7.2 INVESTIGATION ACTIVITIES PERFORMED

A site investigation was conducted by ORNL in 1992 and 1993. The objective of the site investigation was to identify and characterize, if necessary, the potential impacts to site soil and groundwater. The investigation consisted of:

- **Groundwater Screening Survey –** HydroPunch groundwater samples were collected from 15 locations within a 125 feet by 175 feet area overlying Site 14 (Figure 7-1). Headspace analysis of groundwater screening samples was performed using a field gas chromatograph.
- **Use of Existing Piezometers –** Since Site 14 is located between Sites 2 and 5, piezometers installed at Sites 2 and 5 were utilized to estimate the groundwater flow direction and to determine the optimum placement of monitoring wells at Site 14.
- **Soil Sampling** - Five soil borings were installed at the site using a hollow-stem auger drill rig (Figure 7-2). Thirteen soil samples were collected from the five boring at depths up to 8 feet. All soil samples, except the duplicate, which was only sampled for TPH, were analyzed for VOCs, SVOCs, TPH, and metals.
- **Groundwater Sampling** - Two monitoring wells (MW-15 and MW-18) were installed at the site (Figure 7-2), and groundwater samples were collected in December 1992 and March 1993. Samples collected during these two events were analyzed for VOCs, SVOCs, TPH, and metals.

A remedial investigation was performed by ERM in 1995 to further characterize the nature and extent of impacts at this site. This investigation consisted of:

- **Soil Sampling –** Four additional soil borings were installed using a hollow-stem auger drill rig (Figures 7-2). Eight soil samples were collected from the four borings at depths up to 9 feet. All soil samples were analyzed for VOCs, SVOCs, and TPH.
- **Groundwater Sampling** - Groundwater sampling was conducted in the two existing wells at the site on three separate events in 1995. Samples collected during the RI sampling events were analyzed for VOCs, SVOCs, TPH, and lead.

7.3 INVESTIGATION RESULTS

7.3.1 Site Investigation Results

Groundwater Screening Survey - The groundwater screening survey results are summarized in Table 7-1. As shown, six of the 15 screening samples displayed a positive result, thus indicating the possibility of fuel-related compounds in groundwater.

Groundwater Level Measurements – Groundwater level measurements at Sites 2 and 5 indicate that the local groundwater flow direction at Site 14 is likely to be towards the southeast.

Soil Sampling – Soil analytical data are summarized in Table 7-2. Several VOCs were detected in eight soil samples at Site 14. These compounds included:

- Tetrachloroethene was detected in two samples, both at concentrations of 3 μg/kg;
- 2-butanone was detected in one sample at a concentration of 11 μg/kg;
- Chloroform was detected in three samples at concentrations ranging between 1 and 2 μg /kg;
- Methylene chloride was detected in two samples at concentrations of 2,200 and 5,100 μg /kg; and
- Xylenes were detected in three samples at concentrations ranging between 2 to 2,500 μg/kg.

With the exception of methylene chloride, all VOCs detected were below their respective cleanup levels.

Low levels of SVOCs were also detected in five soil samples collected at Site 14 (Table 7-2); however, all were below their respective cleanup level. These compounds included:

- 2-Methylnaphthalene was detected in three samples at concentrations ranging between 100 to 27,000 μg/kg;
- Dibenzofuran was detected in one sample at a concentration of 210 μg/kg;
- Naphthalene was detected in three samples at concentrations ranging between 920 to 16,000 μg/kg;
- Acenaphthene was detected in one sample at a concentration of 210 μg/kg.

TPH was detected in ten soil samples ranging from 0.07 to 4,809 mg/kg (Table 7-2). Four of the samples exceeded the cleanup level of 210 mg/kg.

Although analysis for inorganic compounds was not planned for soil samples collected at Site 14, all samples were inadvertently were analyzed for metals (including aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc). However, all detections of these compounds were within the background ranges detected at the base.

Groundwater Sampling – Groundwater analytical data collected during the site investigation are summarized in Table 7-3. Three organic compounds were detected in both wells during December 1992 and March 1993. Carbon disulfide (2 μg/l), butylbenzyl phthalate (1 μg/l), and di-n-butyl phthalate (1 μg/l) were detected in MW-18. Butylbenzyl phthalate (1 μg/l) was also detected in MW-15. However, the detected concentrations were all at or below the cleanup levels or background ranges.

7.3.2 Remedial Investigation Results

Soil Sampling – Soil analytical data are summarized in Table 7-4. Total VOCs and total SVOCs detected in all soil samples collected at Site 14 are shown on Figure 7-3. Several VOCs were detected in the soil samples collected during the remedial investigation; however, the detected

concentrations were all below the cleanup levels for these compounds. The detected compounds included:

- 2-Hexanone (32 μg/kg);
- 4-Methyl-2-pentanone (18 μg/kg);
- Acetone (42 to 383 μg/kg);
- Methylene Chloride (11 to 62 μg/kg); and
- Xylenes (12 to 2,300 μg/kg).

SVOCs were not detected in any soil samples collected during the remedial investigation.

TPH was detected in two soil samples collected from boring SB-14 at concentrations of 169 and 2,500 mg/kg (Table 7-4). Only one of these samples exceeded the cleanup level of 210 mg/kg. TPH concentrations detected at Site 14 are also shown on Figure 7-4.

Groundwater Sampling – Groundwater analytical data collected to date are summarized in Table 7-3. Groundwater sampling conducted over three separate events during the remedial investigation in 1995 did not detect any chemical compounds.

7.4 SITE STATUS

The site has been paved over and now serves as a parking area for ANG maintenance vehicles. Currently, only water levels are being collected from the two remaining wells at the site.

7.5 RATIONALE FOR CLOSURE

Based on results from the site and remedial investigations, the ANG is requesting closure for Site 14 for the following reasons:

- Results of the site and remedial investigations indicate that TPH compounds exist in soil at the site at concentrations exceeding the cleanup levels. The impacted soil, however, is confined to very localized areas within Site 14. Additionally, the impacted soil does not appear to have migrated to groundwater. The site is currently paved, thus, no direct contact with human receptors is likely.

- Two monitoring wells are located within the areas of soil impact. Groundwater samples collected from these two wells over five separate occasions did not contain VOCs, SVOCs, or TPH at concentrations exceeding the method detection limits, cleanup levels, or background level. The three most recent sampling events did not detect any compounds.

Tables

Table 2-1

Groundwater Screening Survey Results
Site 2
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Grid Coordinates (x,y)	Photoionization Detector (ppm)	Gas Chromatograph Decision
S201	0,0	30	Positive
S202	0,-50	0.10	Negative
S203	50,0	7.0	Positive
S204	-50,0	50	Positive
S205	0,50	70	Positive
S206	0,0	8.0	Negative
S207	50,50	2.0	Positive
S208	50,-50	7.0	Positive
S209	0,100	48	Positive
S210	-50,-50	2.0	Negative
S211	100,50	2.0	Negative
S212	-75,50	0.0	Negative
S213	-100,0	1.8	Negative
S214	100,175	1.5	Negative
S215	-45,175	0.80	Negative

Abbreviation:
ppm = Parts per million

Table 2-2

Organic Chemical Constituent Detected in Soil
Site 2
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	BH32 3 ft	BH32 5 ft	BH32 7 ft	BH33 3 ft	BH33 5 ft	BH33 7 ft	BH34 3 ft	BH34 5 ft
Volatile Organic Compounds (µg/kg)									
Chloroform	6,000	1.0 J	1.0 J	1.0 J	ND	2.0 J	2.0 J	ND	1.0 J
2-Butanone	200,000	ND	12 J	-	4,400 J	ND	ND	9.0 J	ND
1,2-Dichloroethene	NA	ND	ND	ND	200 J	8.0 J	48	ND	ND
Ethylbenzene	70,000	ND	ND	ND	ND	17	12 J	ND	ND
Xylenes	1,000,000	ND	ND	ND	ND	13	-	ND	ND
Semivolatile Organic Compounds (µg/kg)									
bis(2-Ethylhexyl)phthalate	600	88 J	55 J	50 J	89 J	42 J	40 J	79 J	120 J
2-Methylnaphthalene	140,000	ND	ND	ND	ND	84 J	91 J	ND	ND
Naphthalene	140,000	ND	ND	ND	ND	52 J	110 J	ND	ND
PHCs (mg/kg)									
Total Petroleum Hydrocarbons	210	84.69	1.83	1.17	ND	12.43	0.12	0.17	ND

Notes:
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.

Abbreviations:
µg/kg = Micrograms per kilogram
ft = Feet
mg/kg = Milligrams per kilogram
NA = Not available
ND = Not detected
PHCs = Petroleum hydrocarbons

Table 2-3

Chemical Constituents Detected in Groundwater
Site 2
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	Background Range	MW-08/08R													MW-09		MW-11						
			Dec-92	Mar-93	Mar-98	Aug-98	Sep-98	Nov-99	May-00	Nov-00	Sep-03	Mar-03	Oct-03	Apr-03	Oct-03	Oct-03 (D)	Dec-92	Mar-93	Dec-92	Mar-93	May-99	Oct-03	Apr-03	(D)	Oct-03
Volatile Organic Compounds (µg/l)																									
Trichloroethene	5.0	ND	**6.0**	2.0 J	NS	NS	NS	ND	ND	ND	1.2	ND	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene	NA	ND	ND	18	NS	NS	NS	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS
cis-1,2-Dichloroethene	70	ND	ND	ND	NS	NS	NS	20	ND	12	31	7.5	23	25	34	49	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	ND	ND	ND	NS	NS	NS	ND	ND	ND	1.7	ND	2.6	2.2	2.0	3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5.0	ND	ND	ND	NS	NS	NS	ND	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1,000	1.0 J	ND	ND	NS	NS	NS	ND	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tertiary butyl ether	NA	ND	NS	NS	NS	NS	NS	NS	NS	5.2	8.1	9.6	3.0	5.4	ND	1.1	NS	NS	NS	NS	ND	3.7	3.5	3.3	5.0
Semivolatile Organic Compounds (µg/l)																									
Di-n-octyl phthalate	700	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	1.0 J	ND	ND	NS	NS	NS	NS
Diethyl phthalate	NA	1.0	ND	1.0 J	NS	NS	NS	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS
Pentachlorophenol	NA	ND	ND	1.0 J	NS	NS	NS	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	2.0 J	ND	ND	ND	NS	NS	NS	NS
2-Methylnaphthalene	1,400	ND	ND	ND	NS	NS	NS	ND	17	ND	NS	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS
Inorganic Analytes (µg/l)																									
Aluminum	NA	305 - 568	389	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	366	ND	392	ND	NS	NS	NS	NS	NS
Antimony	NA	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	ND	36.2	NS	NS	NS	NS	NS
Arsenic	50	84.5 - 152	43.4 J	50	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	26.8 J	29.5	45.2 J	49.8	NS	NS	NS	NS	NS
Barium	2,000	17.7 - 39.4	95.5	41.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	50.2	23.5	64.2	92.2	NS	NS	NS	NS	NS
Calcium	NA	18,600 - 47,400	61,600	85,400	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	43,200	74,300	66,000	53,500	NS	NS	NS	NS	NS
Copper	1,000	6.6 - 11.9	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	11.3	ND	NS	NS	NS	NS	NS
Iron	300	55.9 - 360	35.9 J	65.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	21.7	ND	262	NS	NS	NS	NS	NS
Magnesium	150,000	40 - 6,880	12,400	17,000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	8,300	15,800	21,100	24,700	NS	NS	NS	NS	NS
Manganese	50	15.6 - 172	**248**	**127**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**111**	**93.6**	**1,350**	**3,030**	NS	NS	NS	NS	NS
Potassium	NA	2,850 - 14,500	12,400	10,600 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	8,820	9,130 J	17,200	15,800 J	NS	NS	NS	NS	NS
Sodium	NA	16,500 - 443,000	150,000	157,000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	98,700	132,000	132,000	81,100	NS	NS	NS	NS	NS
Vanadium	NA	12.5 - 15	13.5	11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	11.9	17.7	6.9	ND	NS	NS	NS	NS	NS
Zinc	5,000	3.8 - 4.2	5.3	5.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.3	ND	4.9	8.7	NS	NS	NS	NS	NS

Notes:

Bold = Result exceeds noted Cleanup Level.

J = Reported value is below the contract required detection limit, but above the instrument detection limit for volatile organic compounds and semivolatile organic compounds.
For inorganics, the reported value is estimated because the associated matrix spike was out of control limits. Values are estimated.

(D) = duplicate sample

Abbreviations:

µg/l = Micrograms per liter
NA = Not available
ND = Not detected
NS = Not sampled

Table 3-1

Groundwater Screening Survey Results
Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Grid Coordinates (x,y)	Photoionization Detector (ppm)	Gas Chromatograph Decision
S301	0,0	1.4	Negative
S302	0,50	0.20	Negative
S303	0,100	0.30	Positive
S304	0,122	11	Positive
S305	-50,122	0.40	Negative
S306	50,0	1.3	Negative
S307	50,50	0.0	Negative
S308	100,100	5.0	Negative
S309	50,122	0.0	Negative
S310	50,100	0.60	Negative
S311	100,122	0.40	Negative
S312	-25,122	0.50	Positive
S313	124,119	1.5	Negative
S314	155,122	0.60	Negative
S315	100,150	0.50	Negative
S316	50,150	1.5	Negative
S317	0,150	0.80	Positive
S318	-25,150	7.0	Positive
S319	-50,150	0.80	Negative
S320	-25,175	1.3	Negative
S321	0,200	0.80	Negative

Abbreviation:
ppm = Parts per million

Table 3-2

Organic Chemical Constituents Detected in Soil
Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	BH03		BH04		BH05	
		6 ft	8 ft	4 ft	6 ft	6 ft	7 ft
Volatile Organic Compounds (µg/kg)							
Chloroform	6,000	2.0 J	2.0 J	1.0 J	ND	ND	ND
Semivolatile Organic Compounds (µg/kg)							
bis(2-Ethylhexyl)phthalate	600	ND	ND	84 J	ND	63 J	83 J

Notes:
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.

Abbreviations:
µg/kg = Micrograms per kilogram
ft = Feet
mg/kg = Milligrams per kilogram
ND = Not detected

Table 3-3

Chemical Constituents Detected in Groundwater
Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	Background Range	MW-20		MW-21				MW-22	
			Dec-92	Mar-93	Dec-92	Dec-92 (D)	Mar-93	Mar-93 (D)	Dec-92	Mar-93
Volatile Organic Compounds (µg/l)										
Toluene	1,000	1.0 J	ND	ND	ND	ND	ND	ND	**2.0 J**	ND
Semivolatile Organic Compounds (µg/l)										
Diethyl phthalate	NA	1.0	ND	ND	ND	ND	1.0	ND	ND	ND
Di-n-octyl phthalate	700	ND	ND	ND	1.0 J	ND	ND	ND	ND	ND
Inorganic Analytes (µg/L)										
Aluminum	NA	305 - 568	194	ND	178	202	ND	ND	196	ND
Antimony	NA	ND	ND	30	ND	ND	ND	ND	ND	ND
Arsenic	50	84.5 - 152	37.9 J	38.7 J	39 J	32 J	30.3 J	26.7	23.2 J	15.8
Barium	2,000	17.7 - 39.4	53.2	83.6	43.7	44.1	52.4	50.4	66.5	63.1
Beryllium	NA	ND	ND	1.0	ND	ND	ND	ND	ND	ND
Cadmium	5.0	ND	ND	5.0	ND	ND	ND	ND	ND	ND
Calcium	NA	18,600 - 47,400	45,400	47,535	44,100	43,700	490,000	48,900	57,400	62,900
Chromium	100	ND	ND	6.0	ND	ND	ND	ND	ND	ND
Cobalt	NA	ND	ND	9.0	ND	ND	ND	ND	ND	ND
Copper	1,000	6.6 - 11.9	8.2	4.0	ND	9.6	6.2	ND	11	ND
Iron	300	55.9 - 360	75.2	ND	ND	ND	ND	ND	75.2	ND
Magnesium	150,000	40 - 6,880	16,000	15,178	12,800	12,800	14,100	14,000	18,100	17,900
Manganese	50	15.6 - 172	**258**	**239.8**	27	26.4	17.1	15.3	**328**	**236**
Mercury	2	ND	ND	0.20 J	ND	ND	ND	ND	ND	ND
Nickel	NA	ND	ND	13	ND	ND	ND	ND	ND	ND
Potassium	NA	2,850 - 14,500	11,000	7,997	9,030	10,300	9,330	8,460	14,800	11,700
Selenium	50	4.2 - 5.5	ND	3.0	ND	ND	ND	ND	ND	ND
Silver	100	ND	ND	5.0	ND	ND	ND	ND	ND	ND
Sodium	NA	16,500 - 443,000	297,000	268,990	221,000	223,000	233,000	227,000	304,000	280,000
Thallium	NA	ND	ND	3.0	ND	ND	ND	ND	ND	ND
Vanadium	NA	12.5 - 15	9.7	8.28	10.6	10.3	7.3	9.2	6.7	6.2
Zinc	5,000	3.8 - 4.2	7.0	ND	4.8	5.6	ND	ND	4.2	ND

Notes:
Bold = Result exceeds noted Cleanup Level.
J = Reported value is below the contract required detection limit, but above the instrument detection limit for volatile organic compounds and semivolatile organic
For inorganics, the reported value is estimated because the associated matrix spike was out of control limits. Values are estimated.
(D) = Duplicate sample.

Abbreviations:
µg/l = Micrograms per liter
NA = Not available
ND = Not detected

Table 4-1

Groundwater Screening Survey Results
Site 5
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Grid Coordinates (x,y)	Photoionization Detector (ppm)	Gas Chromatograph Decision
S501	0,60	4.8	Negative
S502	-50,50	2.2	Negative
S503	40,60	2.4	Negative
S504	0,100	1.4	Negative
S505	0,22	5.0	Positive
S506	25,50	1.0	Positive
S507	-25,75	1.6	Negative
S508	0,0	50	Positive
S509	25,0	5.8	Negative
S510	0,-25	1.2	Negative
S511	25,0	6.2	Positive
S512	25,-25	7.0	Negative
S513	42,0	2.1	Positive
S514	-25,-25	0.80	Negative
S515	42,-25	1.6	Negative
S516	60,-15	1.2	Negative
S517	55,18	1.4	Negative
S518	32,20	80	Positive
S519	-250,25	1.1	Negative

Abbreviation:
ppm = Parts per million

Table 4-2

Organic Chemical Constituents Detected in Soil (during Site Investigation)
Site 5
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	BH06			BH07	BH08		BH09			BH10		
		2 ft	4 ft	6 ft	2 ft	6 ft	7 ft	2 ft	6 ft	7 ft	2 ft	8 ft	9 ft
Volatile Organic Compounds (µg/kg)													
Chloroform	6,000	ND	ND	ND	1.0 J	ND	ND	ND	ND	2.0 J	ND	ND	ND
Acetone	350000	ND	ND	1,900 J	ND	14 J	12 J	ND	ND	ND	ND	ND	ND
Methylene Chloride	500	ND	ND	**4,200 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	70,000	ND	ND	1,800 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	1,000,000	ND	ND	9,700	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/kg)													
2-Methylnaphthalene	140,000	ND	ND	3,300	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	140,000	ND	ND	110 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	140,000	ND	ND	2,400	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	600	62 J	180 J	500 J	250 J	230 J	220 J	190 J	210 J	200 J	ND	260 J	250 J
Benzo(a)anthracene	200	52 J	41 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	200	52 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	200	96 J	63 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	140,000	88 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	200	96 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	480	48 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14,000	ND	41 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	140,000	94 J	ND	96 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	200	39 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	140,000	58 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	110,000	73 J	70 J	68 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHCs (mg/kg)													
Total Petroleum Hydrocarbons	210	ND	ND	**2,166.45**	ND	ND	ND	ND	19	0.08 J	9.9	ND	0.02 J

Notes:
Bold = Result exceeds noted Cleanup Level.
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.

Abbreviations:
µg/kg = Micrograms per kilogram
ft = Feet
mg/kg = Milligrams per kilogram
ND = Not detected
PHCs = Petroleum hydrocarbons

Table 4-3

Chemical Constituents Detected in Groundwater
Site 5
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	Background Level	MW-16				MW-17/17R															MW-19		MW-30	MW-32
			Dec-92	Dec-92(D)	Mar-93	Mar-93(D)	Dec-92	Mar-93	May-95	Aug-95	Nov-95	Feb-97	Aug-97	Mar-98	Mar-98 (D)	May-99	Sep-99	May-00	Nov-00	Mar-03	Oct-03	Apr-03	Dec-92	Mar-93	Jul-95	Jul-95
Volatile Organic Compounds (µg/l)																									
Acetone	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND
Benzene	5	ND	1.0 J	1.0 J	ND	ND	2.0 J	15	14	11	2.3	4.3	7.2	0.95	ND	NS	ND	ND	ND	<1.0	<1.0	<0.50	ND	ND	ND	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	4.0 J	24	20	3.8	4.5	7.0	6.0	ND	ND	NS	ND	ND	ND	<1.0	<1.0	<0.50	ND	ND	ND	ND
Toluene	1,000	1.0 J	ND	ND	ND	ND	7.0 J	1.0 J	3.0	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	<1.0	<1.0	<0.50	ND	ND	ND	ND
Xylenes	10,000	ND	ND	ND	ND	ND	12	7.0 J	20	ND	ND	3.4	2.1	ND	ND	NS	ND	ND	ND	<1.0	<1.0	<0.50	ND	ND	ND	ND
1,2-Dichloroethene	NA	ND	ND	ND	ND	ND	2.0 J	4.0 J	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND
Methylene Chloride	5	ND	ND	ND	ND	ND	ND	ND	3.0	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	NS	NS	NS	ND	ND	1.0	0.20
Methyl-tertiary butyl ether	NA	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.2	4.1	9.8	1.5	2.5	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/l)																									
bis(2-Ethylhexyl)phthalate	NA	ND	1.0 J	1.0 J	ND	ND	ND	20 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	ND	ND
Naphthalene	6.2	ND	ND	ND	ND	ND	ND	1.0 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	ND	ND
PHCs (mg/l)																									
Total Petroleum Hydrocarbons	NA	ND	ND	ND	ND	ND	0.10	0.15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Inorganic Analytes (µg/l)																									
Aluminum	NA	305 - 568	194	185	ND	ND	295	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	35	ND	NS	NS
Antimony	NA	ND	ND	ND	ND	ND	ND	30	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Arsenic	**50**	**84.5 - 152**	**61.6 J**	**54.2 J**	34.1 J	33.2 J	**58.2 J**	32.42	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	19.6 J	11.5	NS	NS
Barium	2,000	17.7 - 39.4	27.6	27.8	25.4	24.2	83.5	68.76	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	27.6	24	NS	NS
Beryllium	NA	ND	ND	ND	ND	ND	ND	1.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Cadmium	5	ND	ND	ND	ND	ND	ND	5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Calcium	NA	18,600 - 47,400	42,600	47,700	50,200	48,400	66,000	64,759	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	47,000	46,900	NS	NS
Chromium	100	ND	ND	ND	ND	ND	ND	6.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Cobalt	NA	ND	ND	ND	ND	ND	ND	9.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Copper	1,000	6.6 - 11.9	ND	10.5	5.3	ND	ND	7.68	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	13.8	21.8	NS	NS
Iron	300	55.9 - 360	125	50.1	ND	ND	49.8 J	164	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Lead	50	ND	ND	ND	ND	ND	ND	2.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Magnesium	150,000	40 - 6,880	10,400	10,500	11,000	10,500	14,300	14,031	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	10,000	9,250	NS	NS
Manganese	**50**	**15.6 - 172**	**218**	**220**	**228**	**229**	**335**	**444.4**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**90.8**	44	NS	NS
Mercury	2	ND	ND	ND	ND	ND	ND	0.20	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Nickel	NA	ND	ND	ND	ND	ND	ND	13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Potassium	NA	2,850 - 14,500	8,040	9,450	8,450	7,520	9,310	9,523.3 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	9,480	7,070	NS	NS
Selenium	50	4.2 - 5.5	ND	ND	ND	ND	ND	3.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Silver	100	ND	ND	ND	ND	ND	ND	5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Sodium	NA	16,500 - 443,000	98,300	102,000	109,000	104,000	69,000	67,168	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	56,500	58,600	NS	NS
Thallium	NA	ND	ND	ND	ND	ND	ND	3.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS
Vanadium	NA	12.5 - 15	ND	ND	ND	ND	ND	4.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.5	6.1	NS	NS
Zinc	5,000	3.8 - 4.2	7.2	3.8	ND	ND	3.3	5.19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	NS	NS

Notes:
Bold = Result exceeds noted Cleanup Level.
J = Reported value is below the contract required detection limit, but above the instrument detection limit for volatile organic compounds and semivolatile organic compounds.
For inorganics, the reported value is estimated because the associated matrix spike was out of control limits. Values are estimated.
(D) = duplicate sample

Abbreviations:
µg/l = Micrograms per liter
mg/l = Milligrams per liter
NA = Not available
ND = Not detected
NS = Not sampled for this constituent
PHCs = Petroleum hydrocarbons

Table 4-4

Volatile Organic Compounds Detected in Soil
(during Remedial Investigation)
Site 5
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Date Sampled	Acetone	4-Methyl-2-pentanone	Ethyl-benzene	Toluene	Xylenes (total)
SB5-1-1.5	05/21/95	ND	ND	ND	ND	ND
SB5-2-2.0	05/21/95	277	ND	211	255	2,040
SB5-2-3.5	05/21/95	31	ND	ND	ND	ND
SB5-2-7.5	05/21/95	226	41	ND	ND	15
SB5-3-3.5	05/21/95	25	ND	ND	ND	ND
SB5-3-5.5	05/21/95	59	ND	ND	ND	ND
SB5-3-7.5	05/21/95	13	ND	ND	ND	ND
SB5-4-3.5	05/21/95	21	ND	ND	ND	ND
SB5-4-5.5	05/21/95	ND	ND	ND	ND	ND
SB5-4-5.5*	05/21/95	15	ND	ND	ND	ND
SB5-4-7.0	05/21/95	ND	ND	ND	ND	ND
Cleanup Level		350,000	280,000	70,000	100,000	1,000,000

Notes:
All concentrations shown in micrograms per kilogram.
* = Duplicate sample

Abbreviation:
ND = Not detected

Table 4-5

Total Petroleum Hydrocarbons Detected in Soil
(during Remedial Investigation)
Site 5
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Date Sampled	TPH (mg/kg)
SB5-1-1.5	05/21/95	ND
SB5-2-2.0	05/21/95	**288**
SB5-2-3.5	05/21/95	ND
SB5-2-7.5	05/21/95	12.5
SB5-3-3.5	05/21/95	ND
SB5-3-5.5	05/21/95	ND
SB5-3-7.5	05/21/95	ND
SB5-4-3.5	05/21/95	ND
SB5-4-5.5	05/21/95	ND
SB5-4-5.5*	05/21/95	ND
SB5-4-7.0	05/21/95	ND
Cleanup Level		**210**

Notes:
Bold = Result exceeds noted Cleanup Level.
* = Duplicate sample

Abbreviations:
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons

Table 5-1

Hydrocarbon Compounds Detected in Soil
Site 12
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Depth (ft)	Date Sampled	TPH	Benzene	Ethyl-benzene	Toluene	Total Xylenes
MW-01	1-2	10/03/91	**2,800**	**0.62**	6.7	ND	11.0
	2-3.5	10/03/91	**410**	ND	ND	ND	ND
	5-6.5	10/03/91	ND	ND	ND	ND	ND
	6.5-8	10/03/91	ND	ND	ND	ND	ND
	9.5-10.5	10/04/91	ND	ND	ND	ND	ND
MW-02	1-2	10/04/91	**1,000**	ND	1.3	ND	2.8
	2-3.5	10/04/91	**900**	ND	0.7	ND	1.6
	3.5-5.5	10/04/91	210	ND	ND	ND	ND
	5.5-6.5	10/04/91	76	ND	0.020	ND	0.057
	6.5-8	10/04/91	ND	ND	ND	ND	ND
	8-9.5	10/04/91	ND	ND	ND	ND	ND
MW-03	1-2	10/04/91	ND	ND	ND	ND	ND
	6.5-8	10/04/91	ND	ND	ND	ND	ND
	9.5-11	10/04/91	ND	ND	ND	ND	ND
Cleanup Level			210	0.50	70	100	1,000

Notes:
Bold = Result exceeds noted Cleanup Level.

Table 5-2

Hydrocarbon Compounds Detected in Groundwater
Site 12
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Date Sampled	TPH (mg/l)	Benzene	Ethylbenzene	Toluene	Total Xylenes
MW-01	10/04/91	ND	ND	1.0	ND	2.0
MW-02	10/04/91	ND	ND	2.0	ND	4.0
MW-02 (D)	10/04/91	ND	ND	ND	ND	2.0
MW-03	10/04/91	ND	ND	ND	ND	ND
Cleanup Level		NA	5.0	NA	NA	NA
MCL		NA	5.0	700	1,000	10,000

Notes:
All concentrations are in micrograms per liter, unless noted.
(D) = duplicate sample

Abbreviations:
MCL = Maximum Contaminant Level
mg/l = milligrams per liter
NA = Not available
ND = Not detected
TPH = Total petroleum hydrocarbons

Table 6-1

Groundwater Screening Survey Results
Site 13
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Grid Coordinates (x,y)	Photoionization Detector (ppm)	Gas Chromatograph Decision
S1301	0,0	1.8	Positive
S1302	30,0	0.50	Negative
S1303	56,0	0.40	Negative
S1304	10,10	2.1	Negative
S1305	40,10	5.0	Negative
S1306	40,120	0.80	Positive
S1307	-20,120	3.0	Negative
S1308	405,100	5.0	Positive
S1309	40,80	50	Positive
S1310	40,57	40.0	Positive
S1311	40,30	2.2	Positive
S1312	-20,60	0.10	Negative
S1313	0,70	3.8	Positive
S1314	-10,110	0.30	Negative
S1315	16,127	30	Positive
S1316	20,150	52	Positive
S1317	-30,80	3.5	Positive
S1318	0,50	5.4	Positive
S1319	60,40	0.60	Negative
S1320	60,55	2.4	Negative
S1321	50,110	34	Positive
S1322	50,150	3.2	Negative
S1323	10,190	1.0	Negative
S1324	50,210	0.40	Negative
S1325	-20,-5	1.0	Negative
S1326	-23,35	0.70	Negative

Abbreviation:
ppm = Parts per million

Table 6-2

Organic Chemical Constituents Detected in Soil
Site 13
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	BH16				BH17				BH18	BH19	BH20	
		4 ft	6 ft	6 ft (D)	8 ft	4 ft	4 ft (D)	6 ft	8 ft	3 ft	2 ft	6 ft	6 ft (D)
Volatile Organic Compounds (µg/kg)													
2-Butanone	200,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	16	ND	ND
Chloroform	6,000	ND	ND	ND	1.0 J	ND	ND	ND	ND	ND	ND	1.0 J	ND
Semivolatile Organic Compounds (µg/kg)													
Benzo(a)anthracene	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	88 J	ND	ND
Benzo(a)pyrene	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	70 J	ND	ND
Benzo(b)fluoranthene	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	140 J	ND	ND
Benzo(k)fluoranthene	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	140 J	ND	ND
bis(2-Ethylhexyl)phthalate	600	88 J	77 J	88 J	66 J	62 J	94 J	74 J	220 J	200 J	ND	ND	ND
Chrysene	480	ND	ND	ND	ND	ND	ND	ND	ND	ND	75 J	ND	ND
Fluoranthene	140,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	160 J	ND	ND
Phenanthrene	140,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	65 J	ND	ND
Pyrene	110,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	130 J	ND	ND
PHCs (mg/kg)													
Total Petroleum Hydrocarbons	210	39	0.21	ND	ND	ND	ND	2.8	ND	34	ND	ND	ND

Notes:
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.
(D) = Duplicate sample

Abbreviations:
µg/kg = Micrograms per kilogram

Table 6-3

Chemical Constituents Detected in Groundwater (during Soil Investigation)
Site 13
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	Background Range	MW-12		MW-13		MW-14	
			Dec-92	Mar-93	Dec-92	Mar-93	Dec-92	Mar-93
Volatile Organic Compounds (µg/l)								
Carbon Disulfide	NA	9.0	ND	ND	ND	14	ND	1.0
Semivolatile Organic Compounds (µg/l)								
bis(2-Ethylhexyl)phthalate	6.0	ND	2.0 J	ND	1.0 J	ND	ND	ND
Butylbenzyl phthalate	100	1	ND	ND	ND	2.0	ND	1.0
Diethyl phthalate	NA	1	ND	ND	ND	ND	ND	1.0
PHCs (mg/L)								
Total Petroleum Hydrocarbons	NA	ND	ND	0.02	ND	ND	ND	ND
Inorganic Analytes (µg/L)								
Aluminum	NA	ND	216	ND	181	ND	213	ND
Arsenic	50	84.5 - 152	16.3 J	25.9	23.2 J	23.6	14.5 J	26.7
Barium	2,000	17.7 - 39.4	44.2	33.9	40.6	43.3	37.3	40.8
Calcium	NA	18,600 - 47,400	59,900	34,700	44,200	40,500	51,400	59,000
Copper	1,000	6.6 - 11.9	9.6	8.1	ND	10.5	7.8	14.8
Iron	300	55.9 - 360	66.9	ND	50.2	ND	75.2	ND
Magnesium	150,000	40 - 6,880	12,400	6,560	8,670	7,890	10,000	11,300
Manganese	50	15.6 - 172	71	15.5	24.1	ND	86.4	73.9
Potassium	NA	2,850 - 14,500	12,100	7,470	8,970	7,910	10,300	9,840
Sodium	NA	16,500 - 443,000	103,000	73,000	96,000	79,100	134,000	153,000
Vanadium	NA	12.5 - 15	6	5.7	8.7	ND	10.1	7.6
Zinc	5,000	3.8 - 4.2	5.8	ND	8.4	ND	10.1	ND

Notes:
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.

Abbreviations:
µg/l = Micrograms per liter
mg/l = Milligrams per liter
NA = Not available
ND = Not detected
PHCs = Petroleum hydrocarbons

Table 7-1

Groundwater Screening Survey Results
Site 14
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Grid Coordinates (x,y)	Photoionization Detector (ppm)	Gas Chromatograph Decision
S1401	0,0	0.40	Negative
S1402	90,0	1.2	Negative
S1403	90,60	3.2	Positive
S1404	90,80	11.4	Positive
S1405	78,87	13	Positive
S1406	80,100	0.70	Negative
S1407	60,100	152	Positive
S1408	70,80	16	Positive
S1409	70,60	5.2	Positive
S1410	60,60	1.2	Negative
S1411	60,155	3.8	Negative
S1412	80,155	0.80	Negative
S1413	125,50	0.50	Negative
S1414	125,75	0.20	Negative
S1415	75,37	0.60	Negative

Abbreviation:
ppm = Parts per million

Table 7-2

Organic Chemical Constituents Detected in Soil (during Site Investigation)
Site 14
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	BH21			BH22			BH23			BH24		BH25	
		4 ft	8 ft	8 ft (D)	4 ft	6 ft	8 ft	4 ft	6 ft	8 ft	4 ft	8 ft	6 ft	8 ft
Volatile Organic Compounds (µg/kg)														
Tetrachloroethene	5	ND	3.0 J	NS	ND	ND	3.0 J	ND	ND	ND	ND	ND	ND	ND
2-Butanone	200,000	ND	ND	NS	ND	ND	ND	11.0 J	ND	ND	ND	ND	ND	ND
Chloroform	6,000	ND	ND	NS	2.0 J	ND	ND	ND	ND	ND	ND	ND	1.0 J	2.0 J
Methylene Chloride	500	ND	ND	NS	ND	ND	ND	ND	**2,200 J**	**5,100 J**	ND	ND	ND	ND
Total Xylenes	1,000,000	ND	13.0	NS	ND	ND	ND	ND	ND	2,500 J	ND	ND	ND	2.0 J
Semivolatile Organic Compounds (µg/kg)														
2-Methylnaphtalene	140,000	ND	2,800	NS	ND	ND	ND	ND	2,200	27,000	ND	ND	210 J	100 J
bis(2-Ethylhexyl)phthalate	600	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	14,000	ND	210 J	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	140,000	ND	14,000	NS	ND	ND	ND	ND	920 J	16,000	ND	ND	ND	ND
Acenaphtene	210,000	ND	210 J	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHCs (mg/kg)														
Total Petroleum Hydrocarbons	210	0.11	**2,600**	110	ND	4.1	**1,700**	0.075	**330**	**4,809**	91.36	0.07 J	ND	ND

Notes:
Bold = Result exceeds noted Cleanup Level.
J = Reported value is below the contract required detection limit, but above the instrument detection limit. Values are estimated.
(D) = Duplicate sample

Abbreviations:
µg/kg = Micrograms per kilogram
ft = Feet
mg/kg = Milligrams per kilogram
ND = Not detected
NS = Not sampled
PHCs = Petroleum hydrocarbons

Table 7-3

Chemical Constituents Detected in Groundwater
Site 14
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Cleanup Level	Background Range	MW-18 Dec-92	MW-18 Mar-93	MW-18 May-95	MW-18 Aug-95	MW-18 Nov-95	MW-15 Dec-92	MW-15 Mar-93	MW-15 May-95	MW-15 Aug-95	MW-15 Nov-95
Volatile Organic Compounds (µg/l)												
Carbon Disulfide	NA	9.0	ND	2.0	ND	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/l)												
Butylbenzyl phthalate	100	1.0	ND	1.0	ND	ND	ND	ND	1.0	ND	ND	ND
Di-n-butyl phthalate	NA	2.0	ND	1.0	ND	ND	ND	ND	ND	ND	ND	ND

Abbreviations:
µg/l = Micrograms per liter
NA = Not available
ND = Not detected

Table 7-4

Organic Compounds Detected in Soil (during Remedial Investigation)
Site 14
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Location	Date Sampled	TPH (mg/kg)	Acetone	Methylene Chloride	2-Hexanone	4-Methyl-2-pentanone	Xylenes (total)
SB14-1-3.5	05/24/95	ND	383	62	ND	ND	ND
SB14-2-3.5	05/24/95	ND	202	50	ND	ND	ND
SB14-2-3.5*	05/24/95	ND	133	31	32	18	ND
SB14-2-5.5	05/24/95	ND	117	18	ND	ND	ND
SB14-3-5.5	05/24/95	**2,500**	127	ND	ND	ND	2,300
SB14-3-7.5	05/24/95	169	125	ND	ND	ND	105
SB14-5-3.5	05/25/95	ND	214	ND	ND	ND	12
SB14-5-5.5	05/25/95	ND	42	ND	ND	ND	ND
SB14-5-9.0	05/25/95	ND	159	11	ND	ND	ND
Cleanup Level		210	350,000	500	17,500	280,000	1,000,000

Notes:
Bold = Result exceeds noted Cleanup Level.
All concentrations shown in micrograms per kilogram, unless noted.
* = Duplicate sample

Abbreviations:
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons

Figures

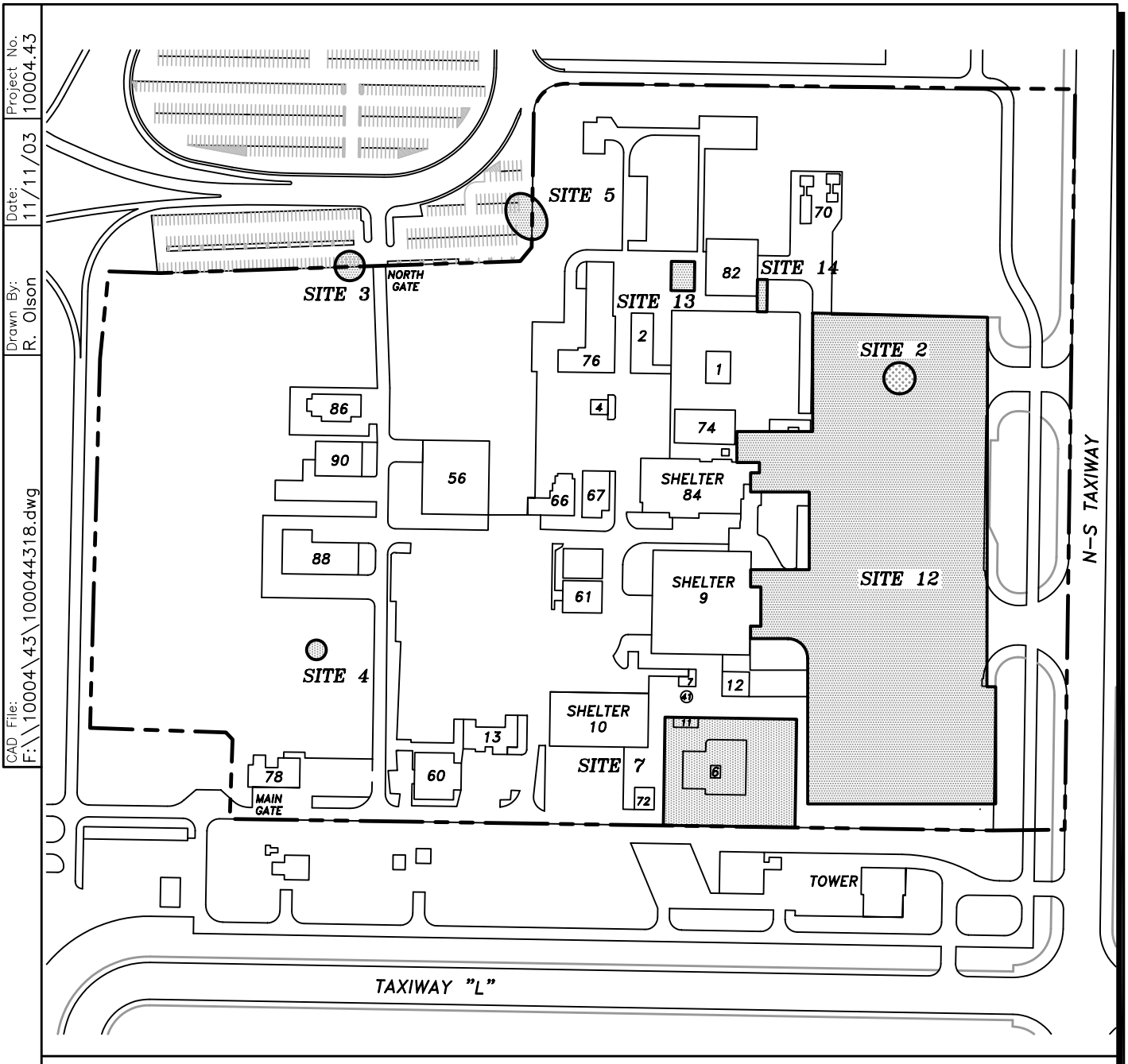
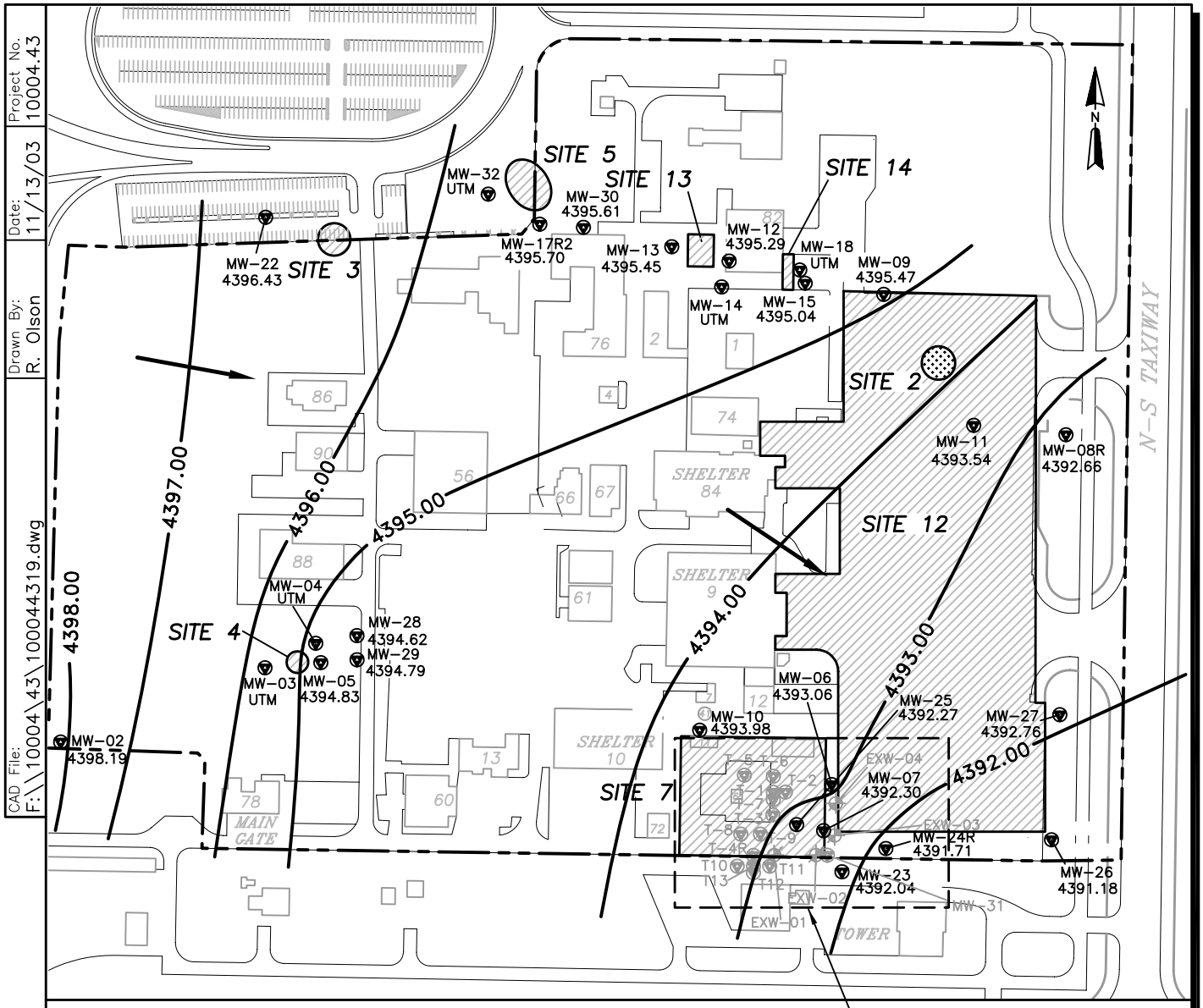


Figure 1-1
ERP Site Location Map
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03



LEGEND

- ORIGINAL ERP SITE
- BASE BOUNDARY
- MONITORING WELL LOCATION
- GROUNDWATER EXTRACTION WELL
- 4396.00 — ELEVATION OF POTENTIOMETRIC SURFACE (FEET ABOVE MEAN SEA LEVEL)
- UTM — UNABLE TO MEASURE
- NM — NOT MEASURED
- GROUNDWATER FLOW DIRECTION

Figure 1-2

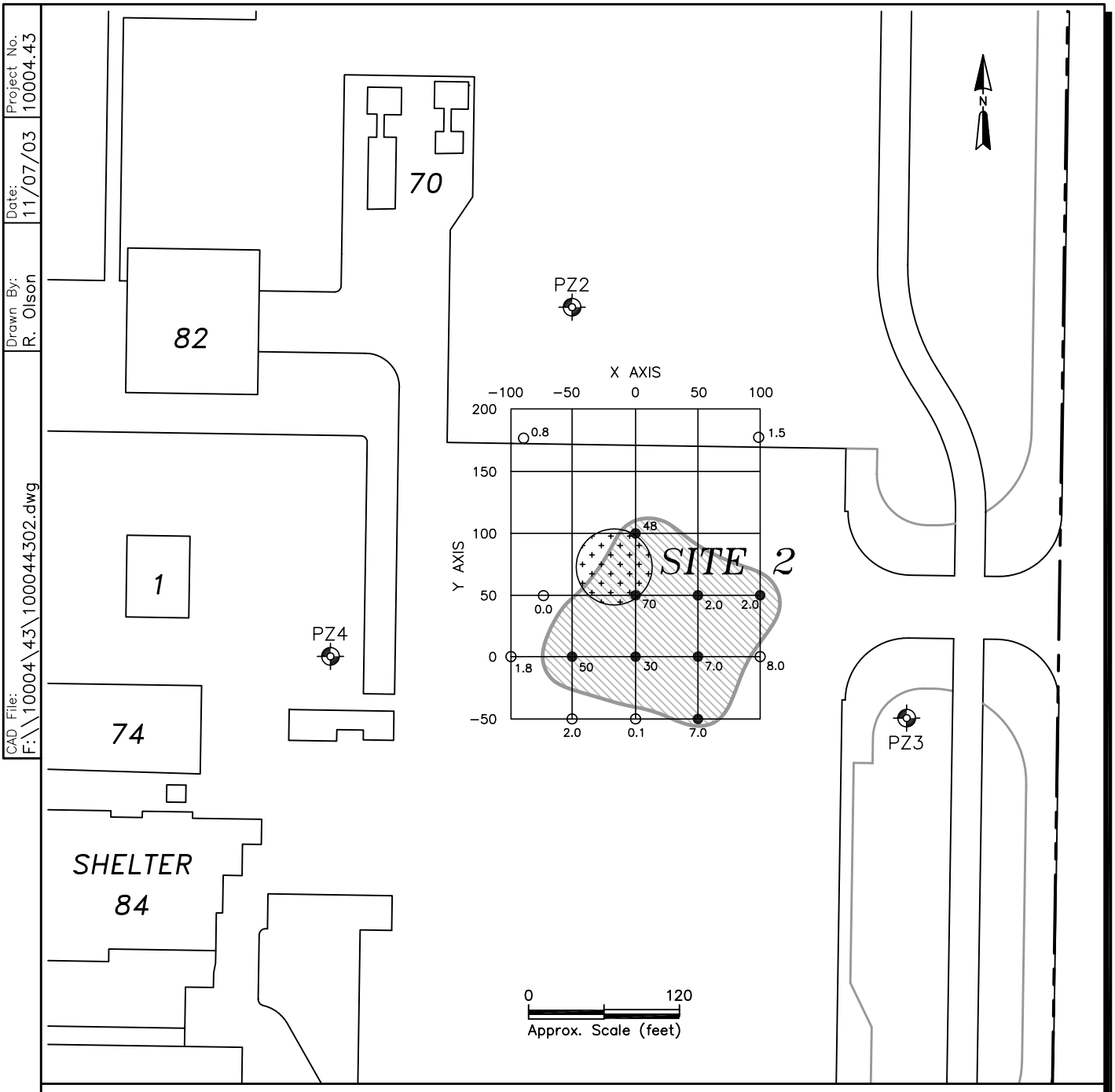
Potentiometric Surface Map

October 2003

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03

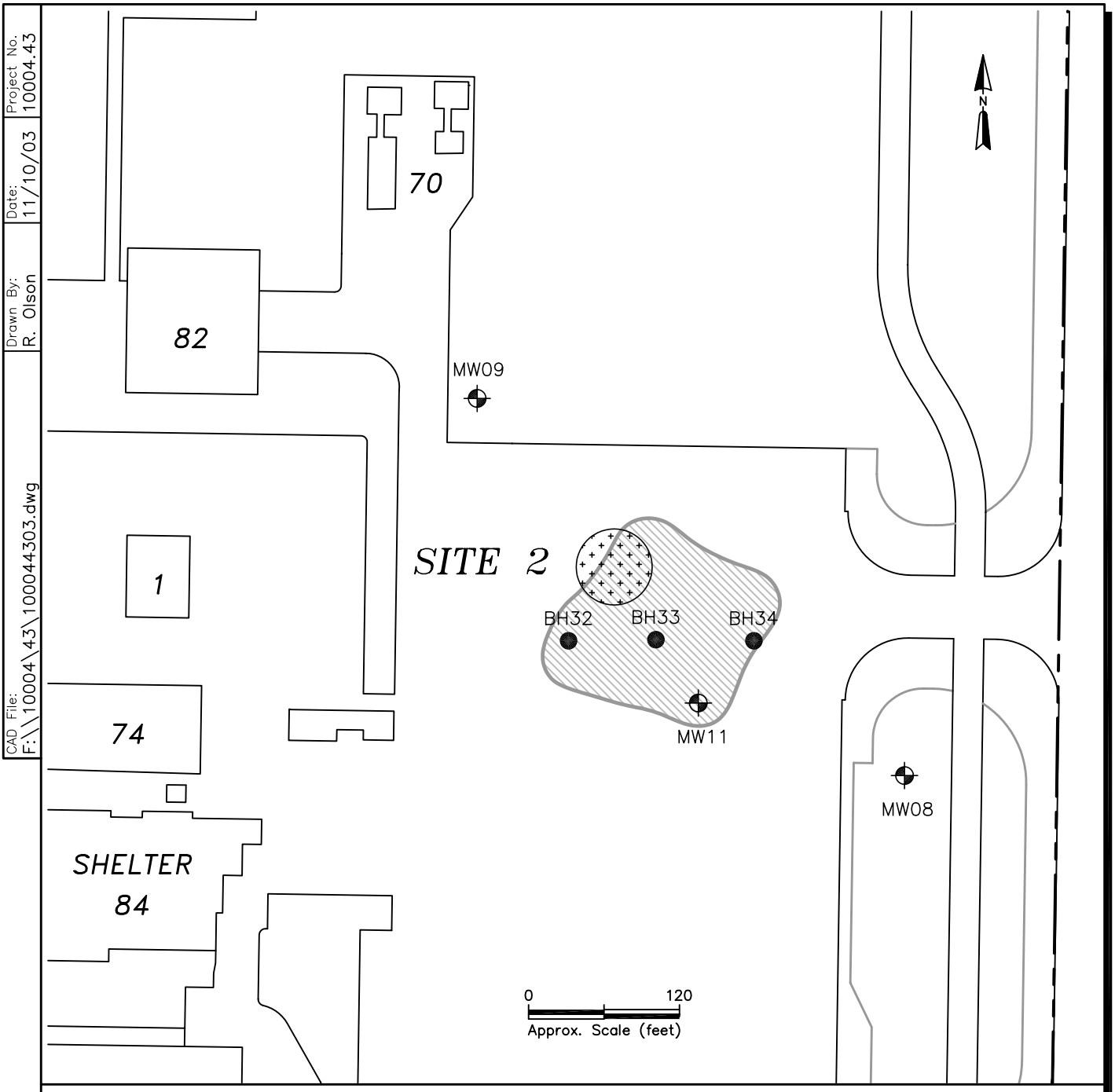


LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Piezometer Location
- ○ 1.8 Negative Groundwater and PID Reading
- ● 50 Positive Groundwater and PID Reading

Figure 2-1
Groundwater Screening Survey and Piezometer Locations
Site 2
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03



LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Monitoring Well Location
- Soil Boring Location

Figure 2-2

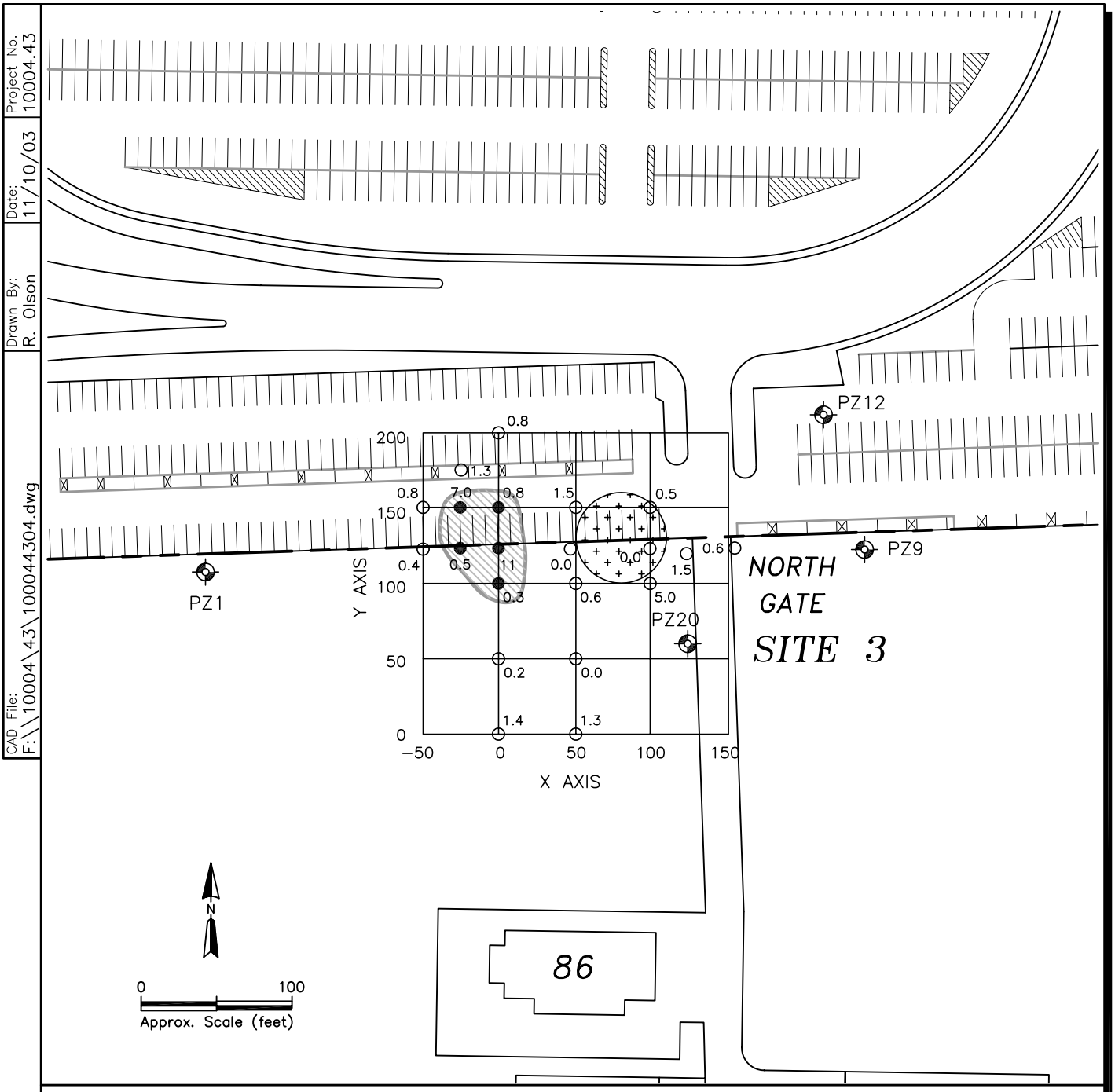
Soil Boring and Monitoring Well Locations

Site 2

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03

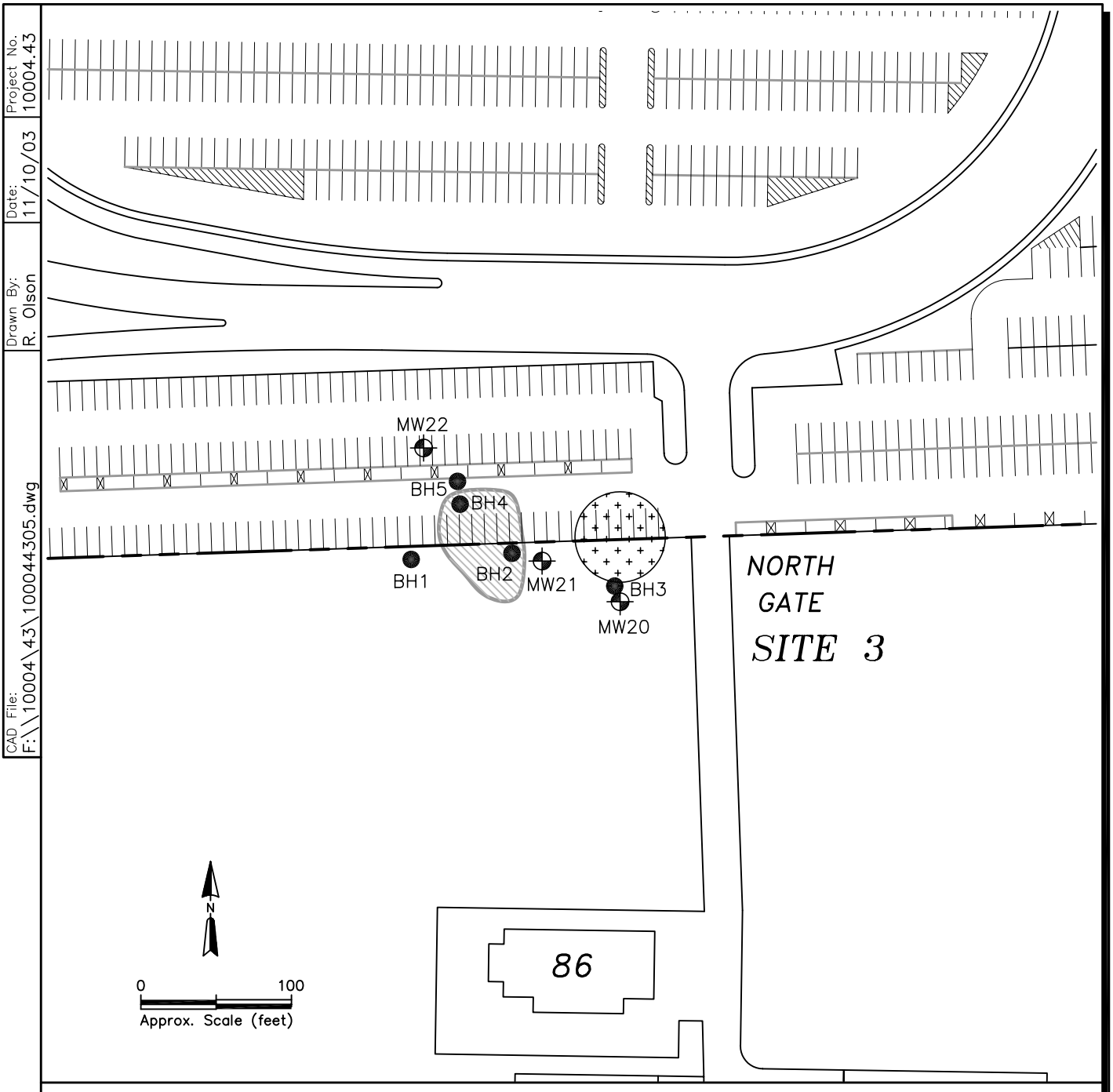


LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Piezometer Location
- ○ 1.4 Negative Groundwater and PID Reading
- ● 11 Positive Groundwater and PID Reading

Figure 3-1
Groundwater Screening Survey and Piezometer Locations
Site 3
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03



LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Monitoring Well Location
- Soil Boring Location

Figure 3-2

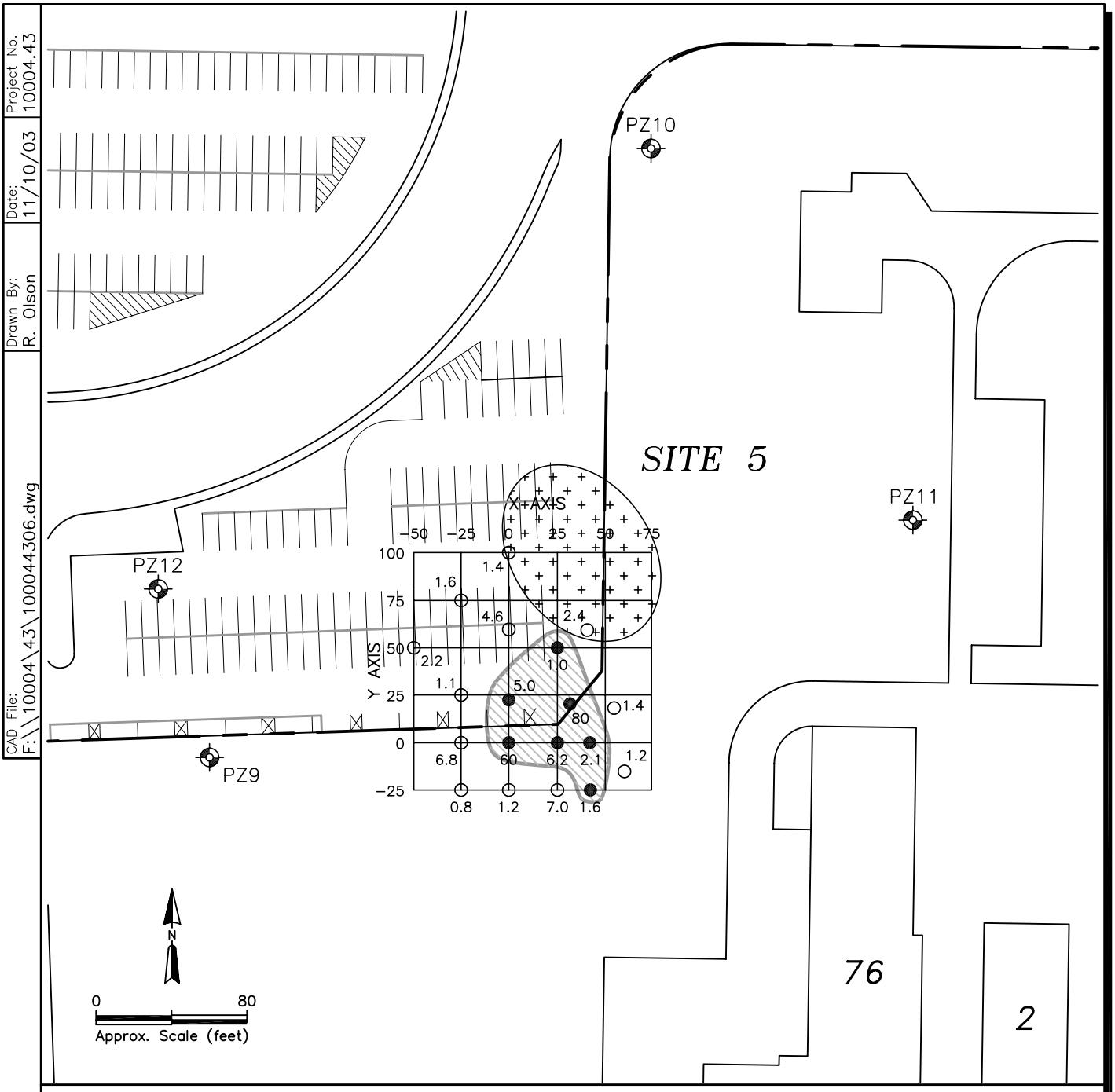
Soil Boring and Monitoring Well Locations

Site 3

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03

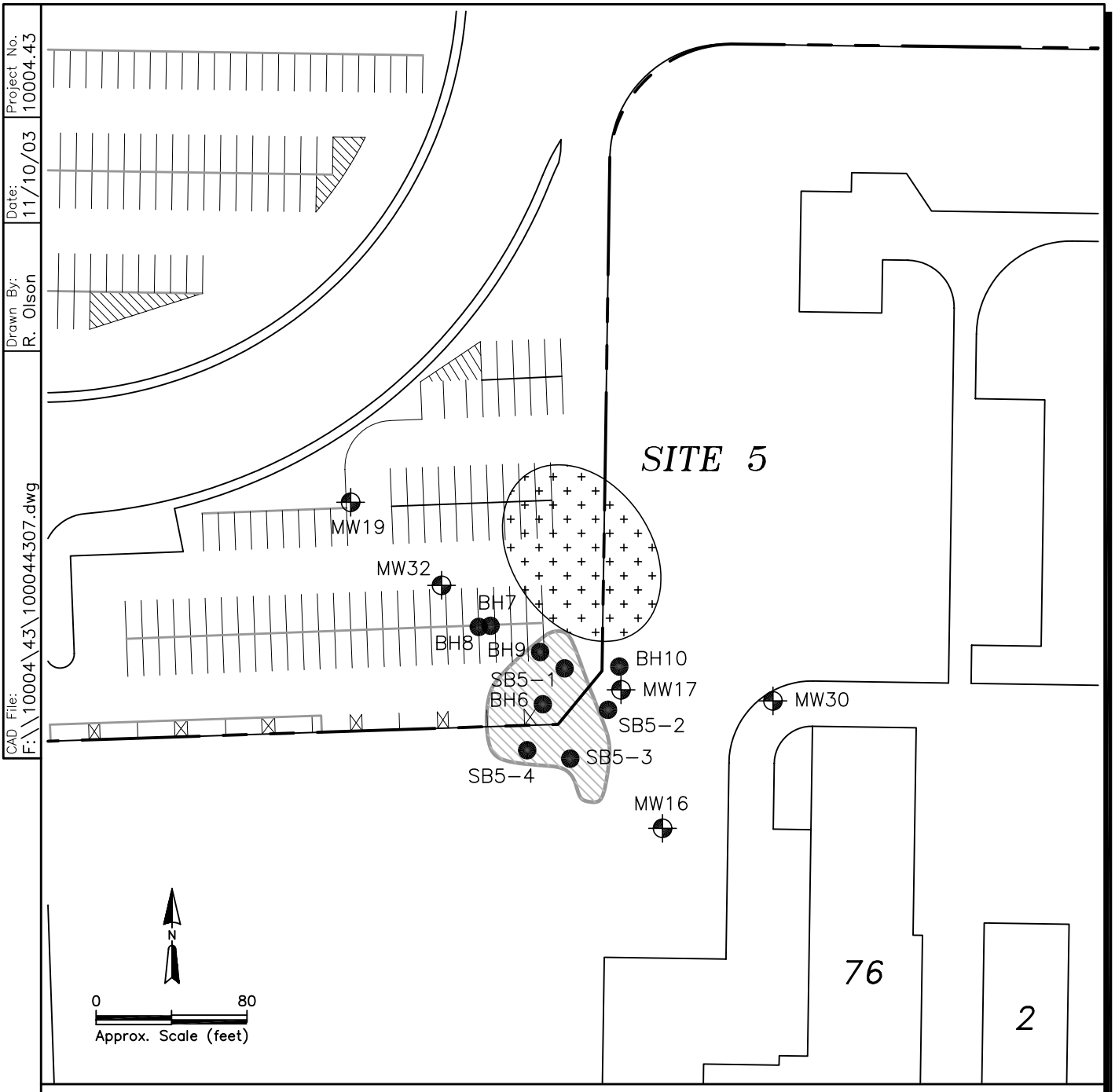


LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Piezometer Location
- ○ 1.8 — Negative Groundwater and PID Reading
- ● 50 — Positive Groundwater and PID Reading

Figure 4-1
Groundwater Screening Survey and Piezometer Locations
Site 5
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03



LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Monitoring Well Location
- BH6 — Soil Boring Location, Site Investigation
- SB5–2 — Soil Boring Location, Remedial Investigation

Figure 4-2

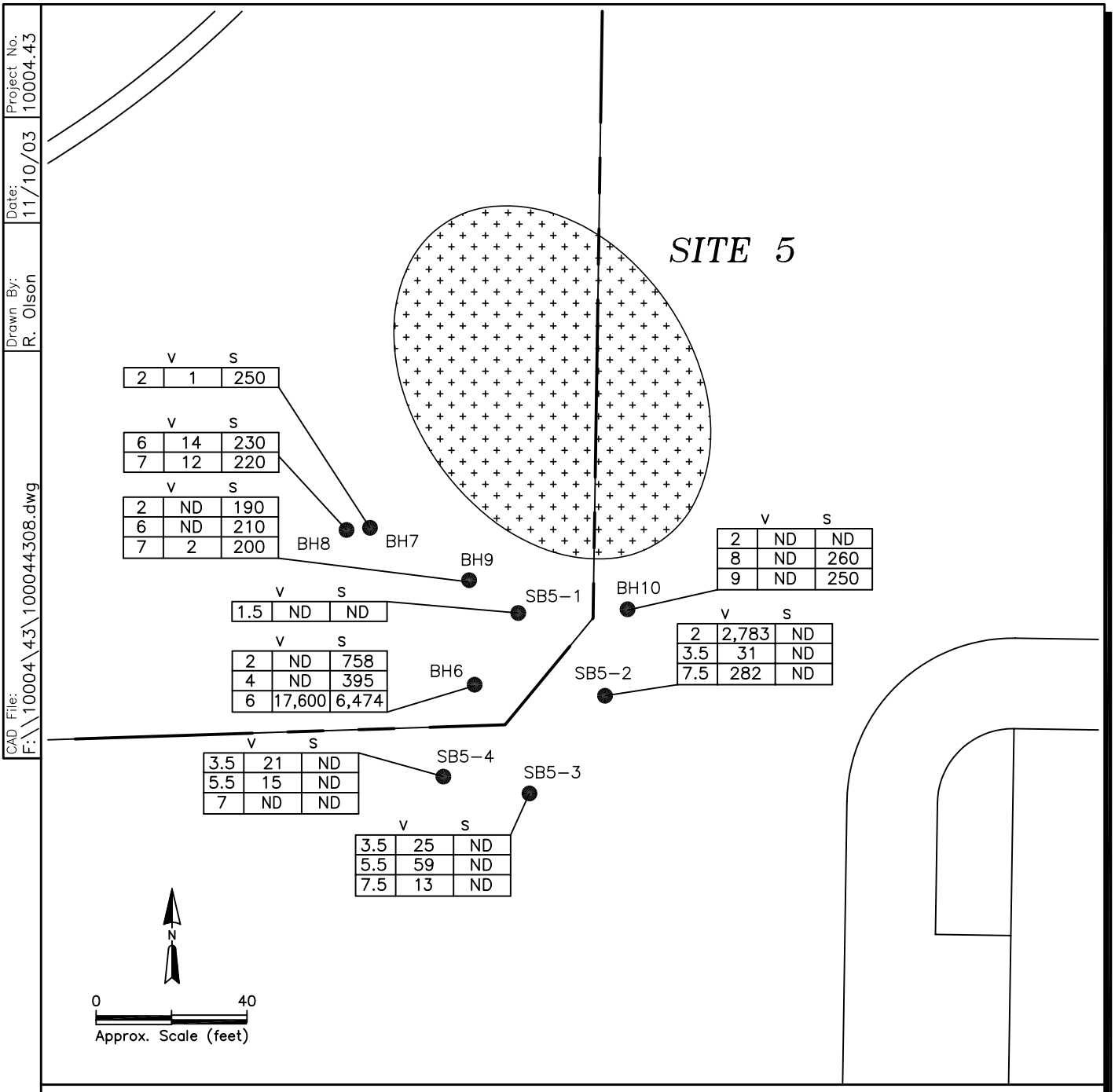
Soil Boring and Monitoring Well Locations

Site 5

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03



LEGEND

Original ERP Site

Base Boundary

BH6 Soil Boring Location, Site Investigation

SB5-2 Soil Boring Location, Remedial Investigation

Semivolatile Organic Compound

Volatile Organic Compound

Depth, feet Below Ground Level

	V	S
3.5	25	ND
5.5	59	ND
7	13	ND

Concentration in micrograms per kilogram

ND Not Detected

Figure 4-3

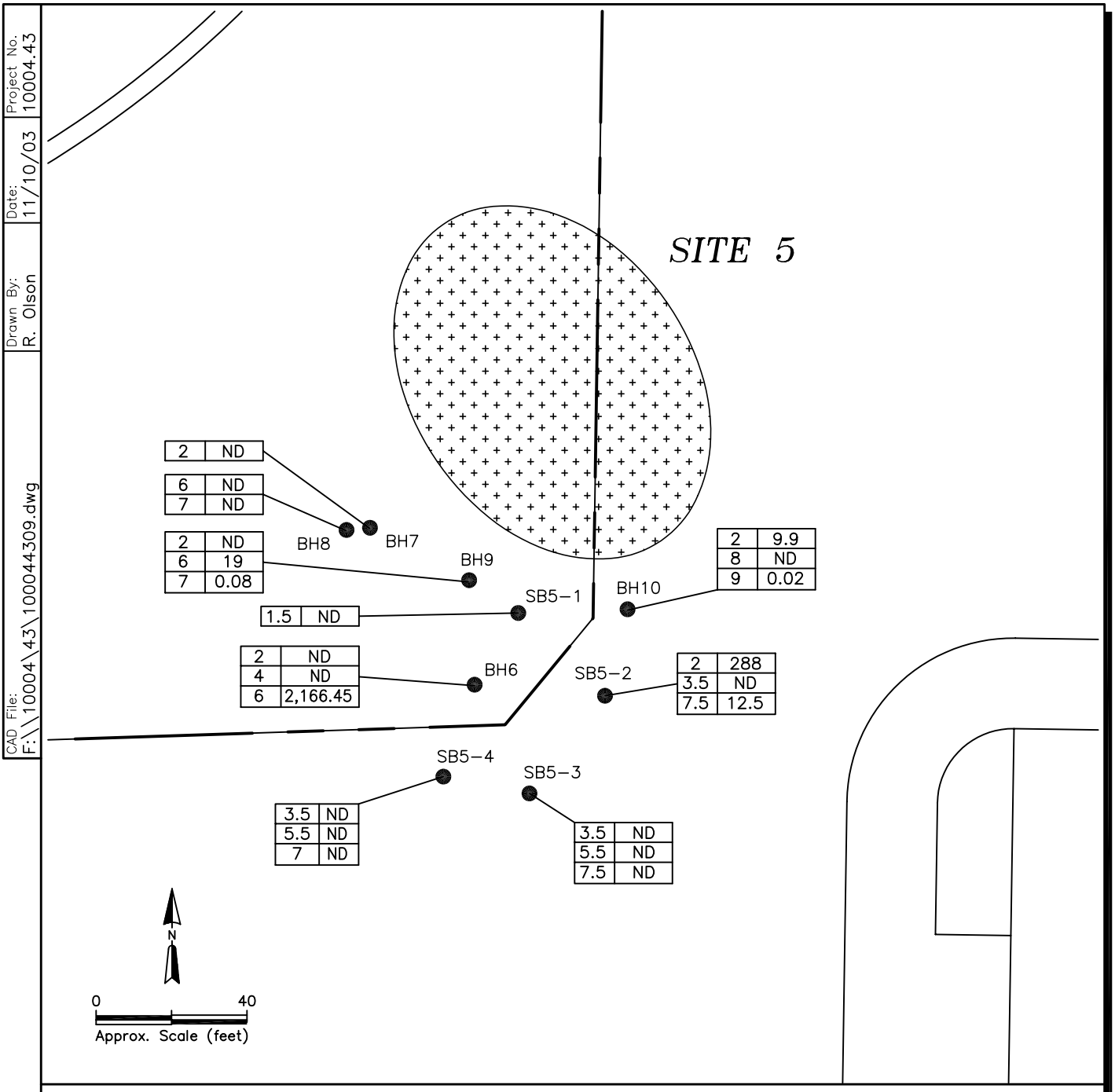
Total Volatile Organic Compounds and Total Semivolatile Organic Compounds in Soil

Site 5

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03



LEGEND

3.5 ND 5.5 ND 7 ND	Depth. feet Below Ground Level Concentration in milligrams per kilogram
ND	Not Detected
	Original ERP Site
	Base Boundary
BH6	Soil Boring Location, Site Investigation
SB5-2	Soil Boring Location, Remedial Investigation

Figure 4-4

Total Petroleum Hydrocarbons in Soil

Site 5

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03

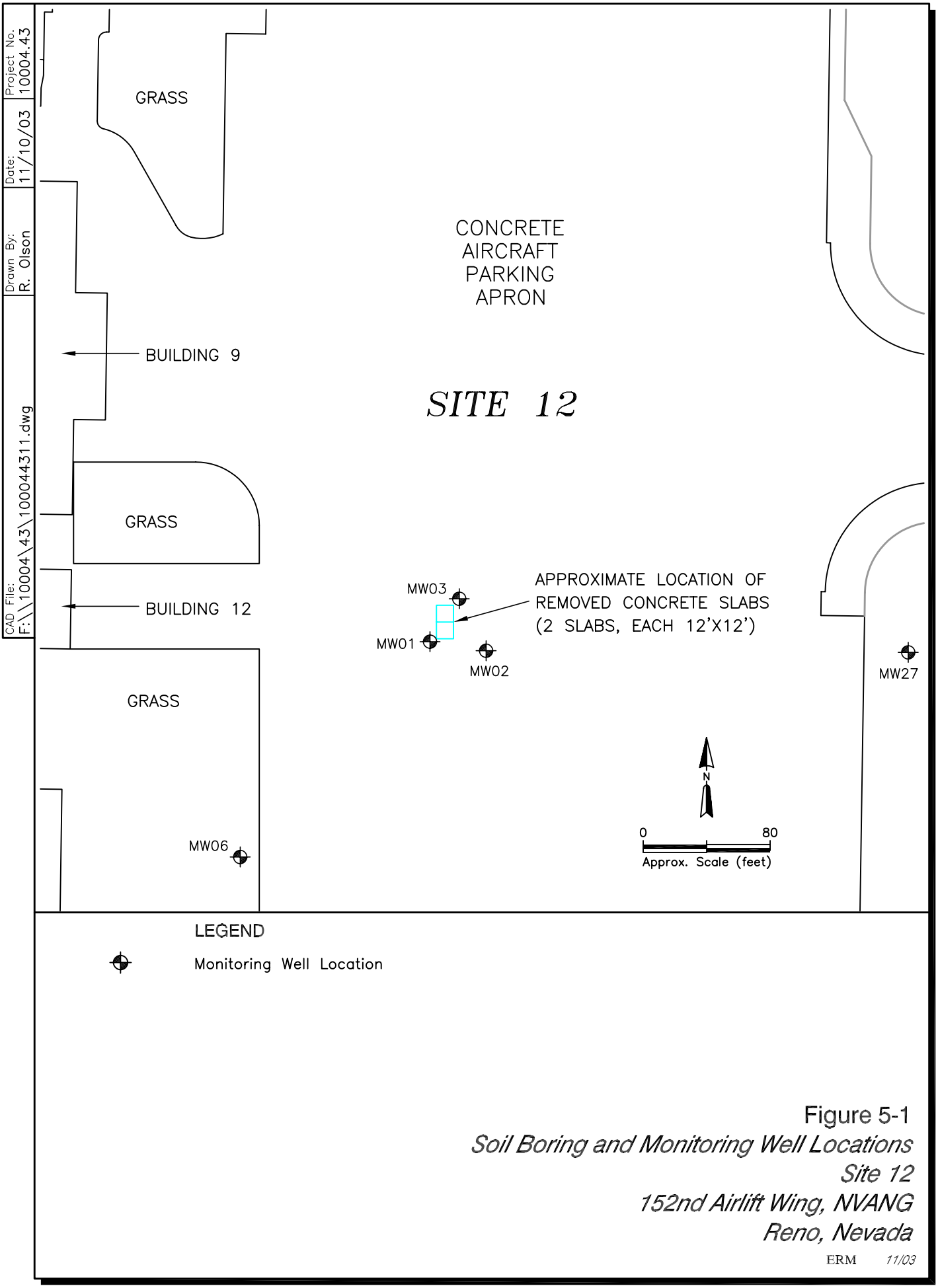


Figure 5-1

Soil Boring and Monitoring Well Locations

Site 12

152nd Airlift Wing, NVANG

Reno, Nevada

ERM *11/03*

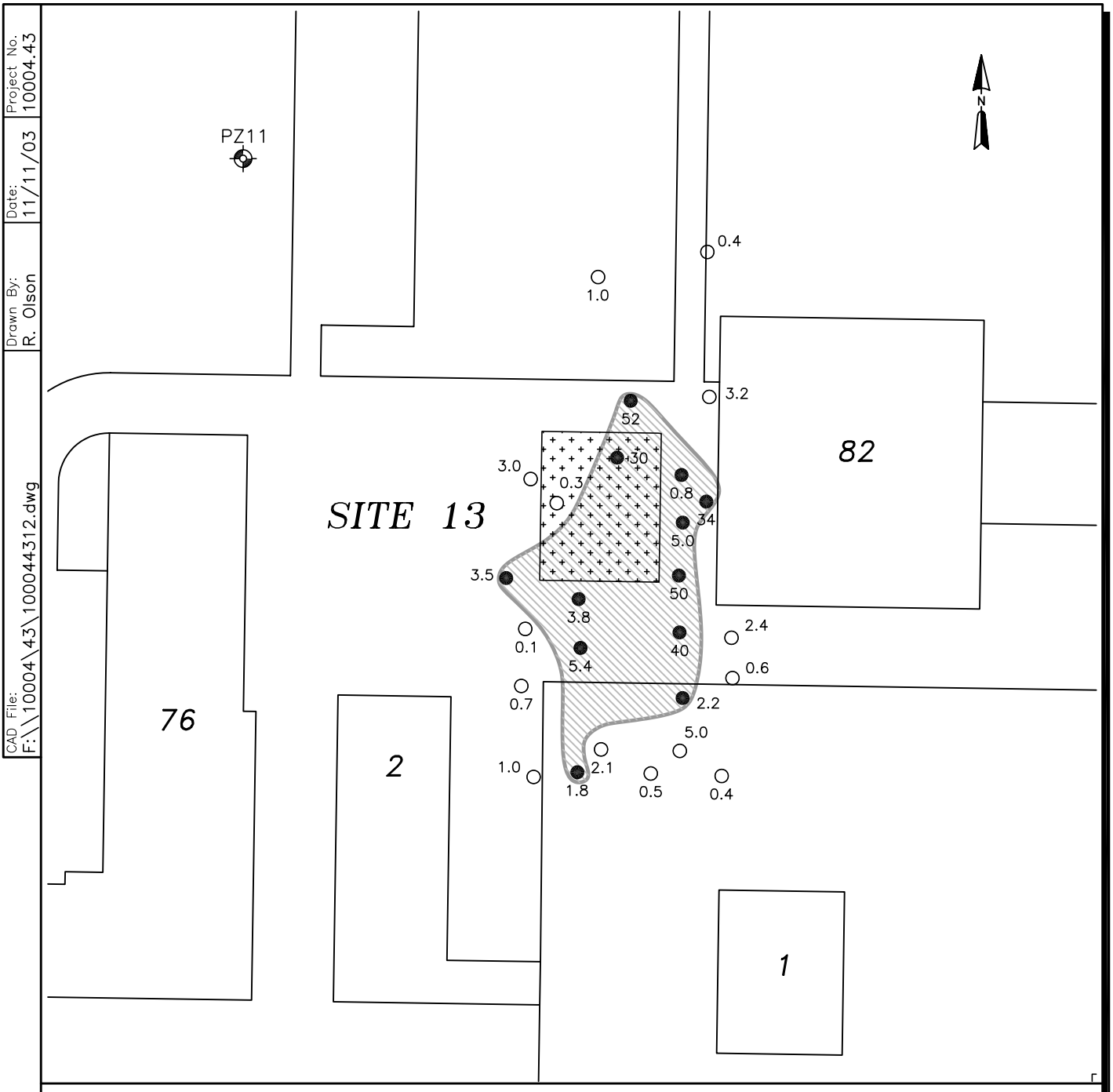


Figure 6-1
Groundwater Screening Survey and Piezometer Locations
Site 13
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03

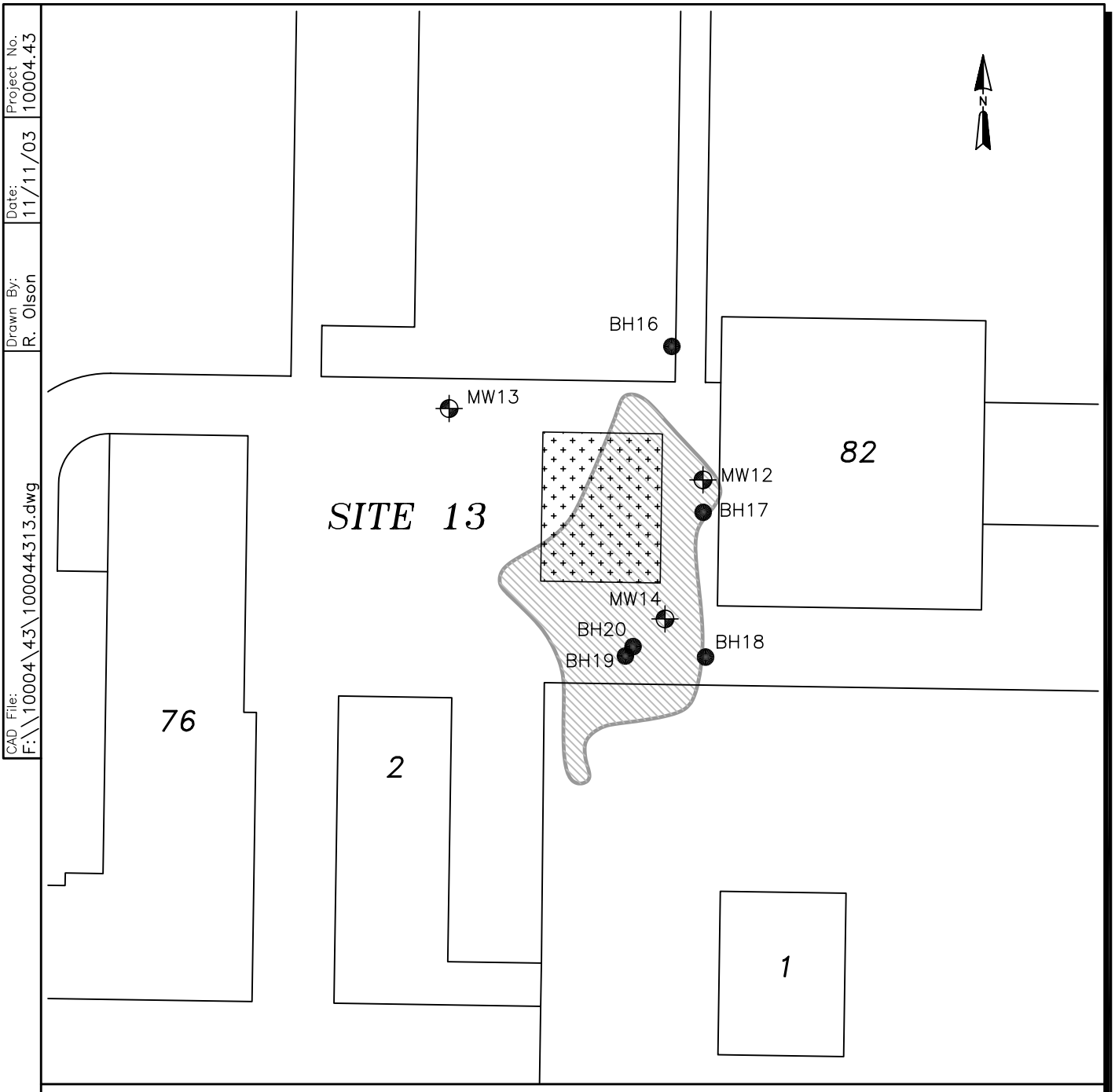


Figure 6-2

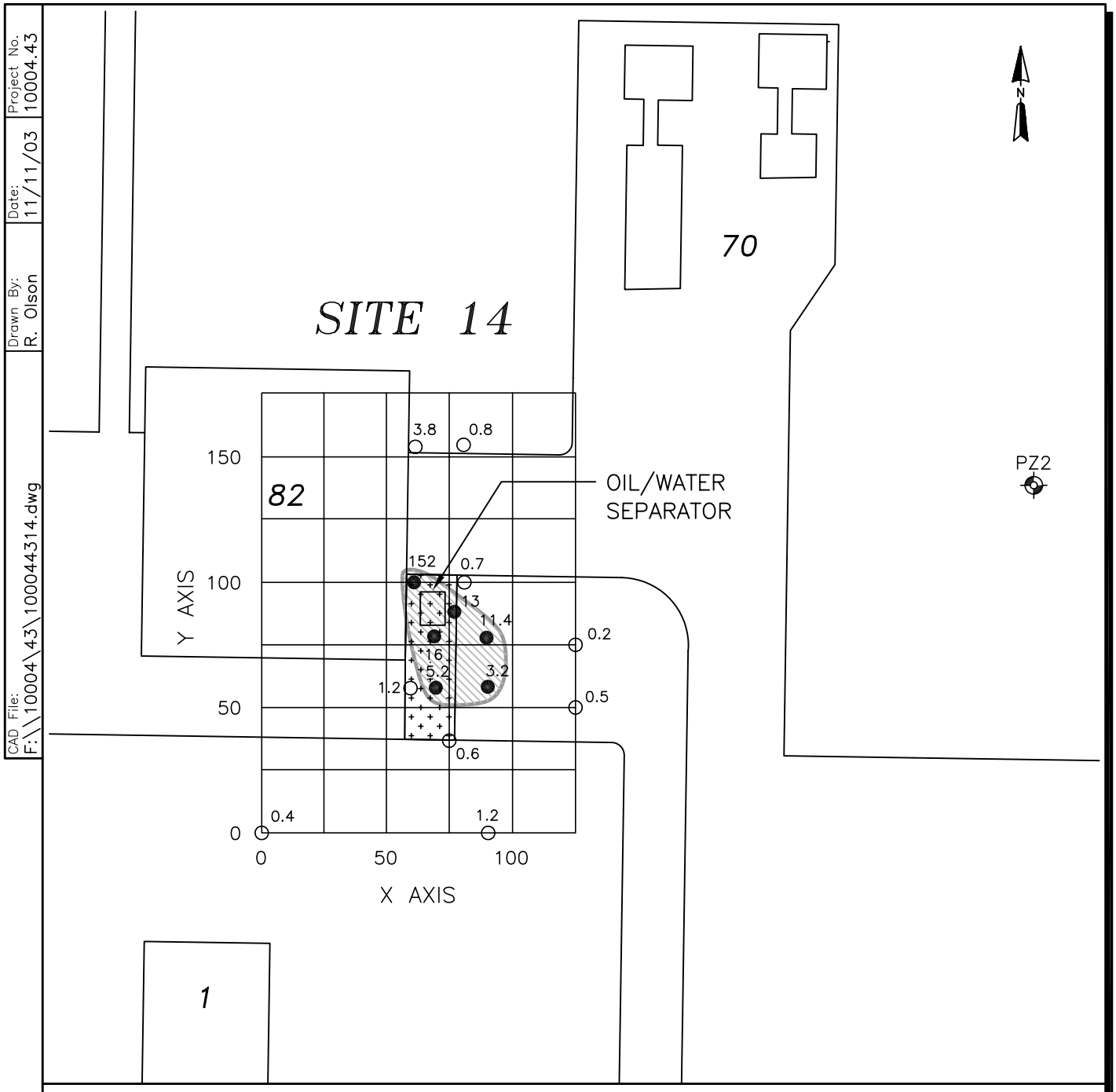
Soil Boring and Monitoring Well Locations

Site 13

152nd Airlift Wing, NVANG

Reno, Nevada

ERM *11/03*



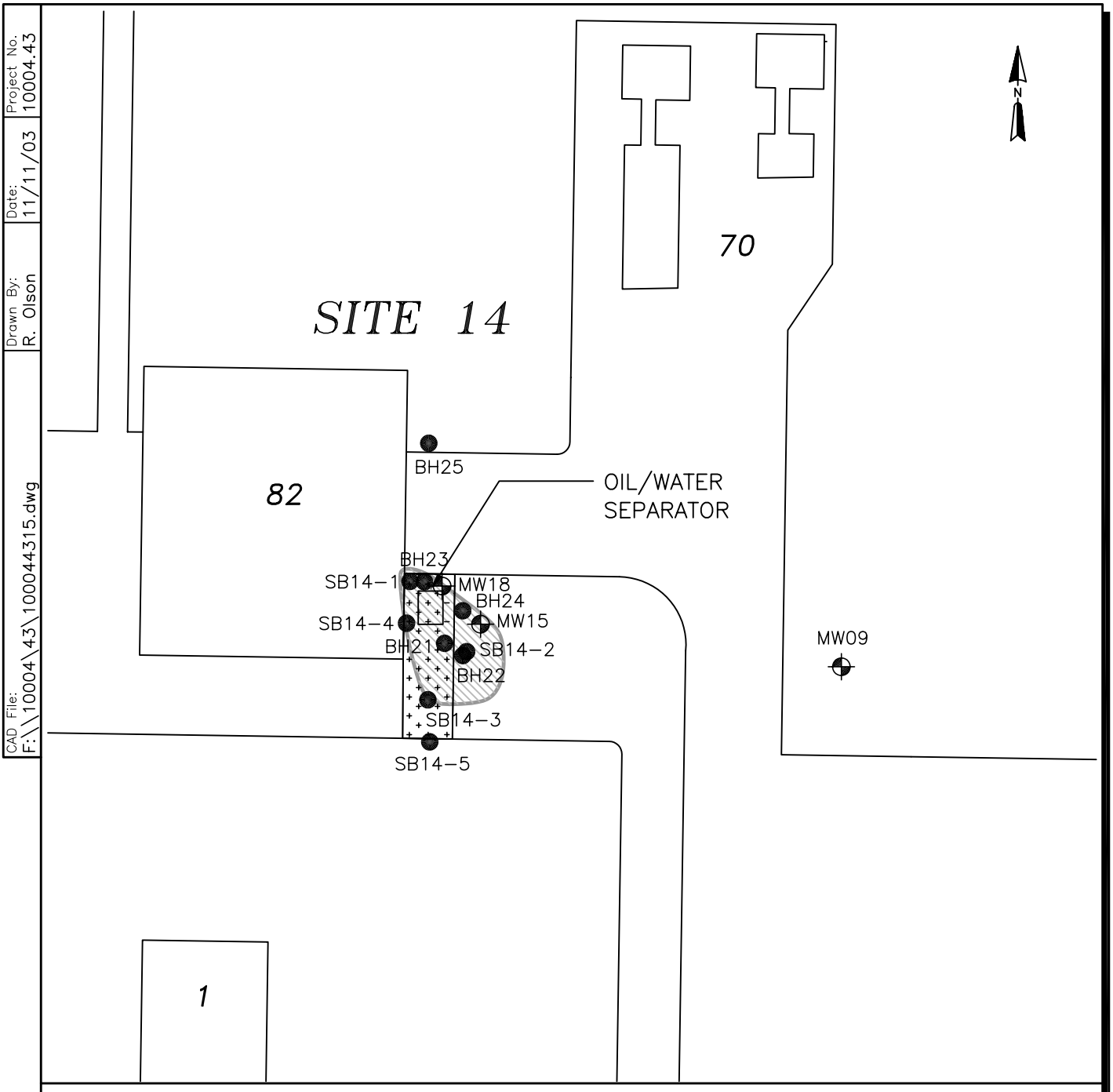
LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Piezometer Location
- ○ 1.8 Negative Groundwater and PID Reading
- ● 50 Positive Groundwater and PID Reading

0 60
Approx. Scale (feet)

Figure 7-1
Groundwater Screening Survey and Piezometer Locations
Site 14
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/03



LEGEND

Original ERP Site

Suspected Area of Contamination From GSM Survey

Monitoring Well Location

BH6 Soil Boring Location, Site Investigation

SB5-2 Soil Boring Location, Remedial Investigation

0 60

Approx. Scale (feet)

Figure 7-2

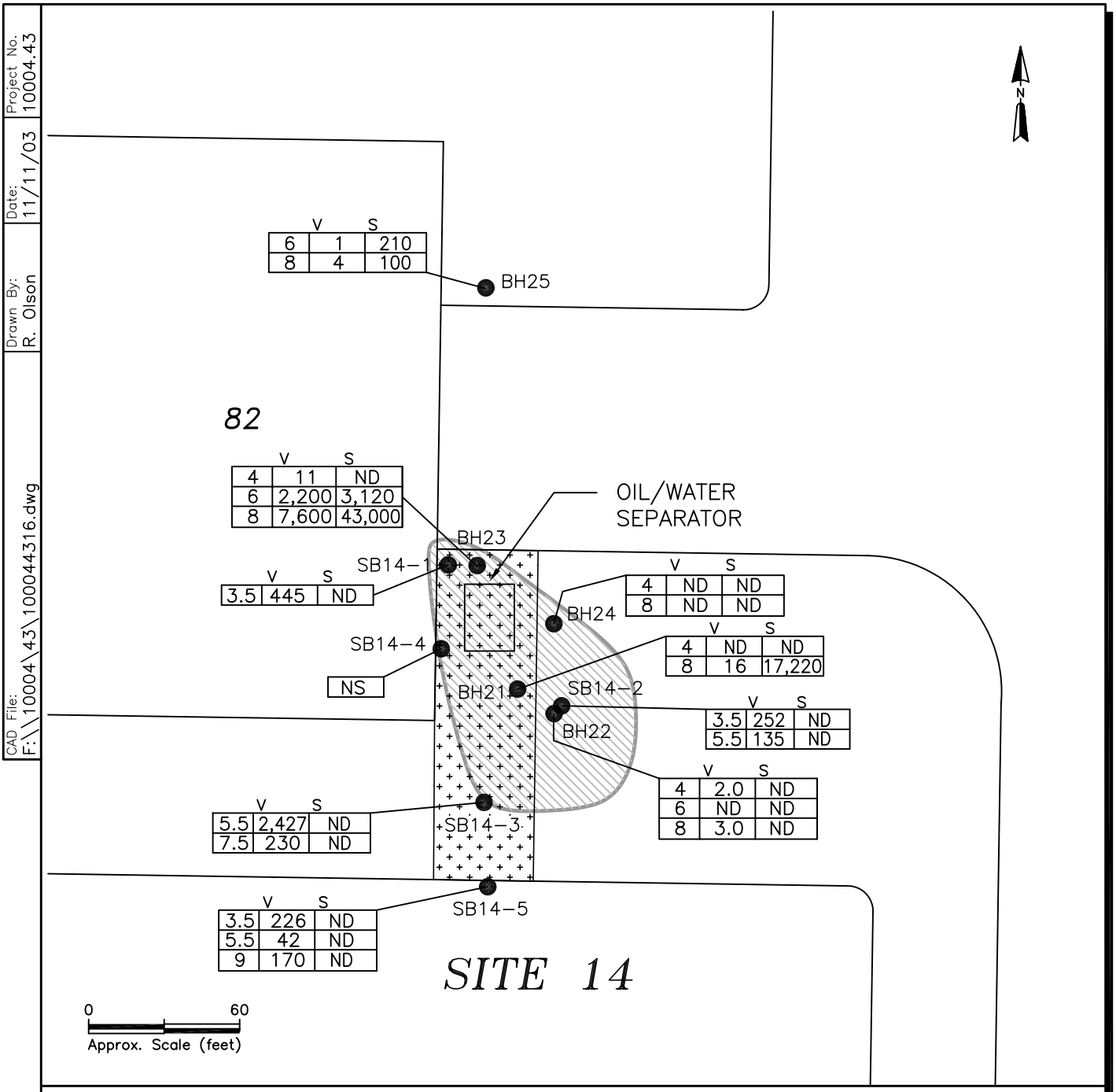
Soil Boring and Monitoring Well Locations

Site 14

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03



LEGEND

BH6 ● Soil Boring Location, Site Investigation

SB5–2 ● Soil Boring Location, Remedial Investigation

Original ERP Site

Suspected Area of Contamination From GSM Survey

Semivolatile Organic Compounds

Volatile Organic Compounds

Depth, Feet Below Ground Level

V	S	
3.5	252	ND
5.5	135	ND

Concentration in micrograms per kilogram

ND Not Detected

NS Not Sampled

Figure 7-3

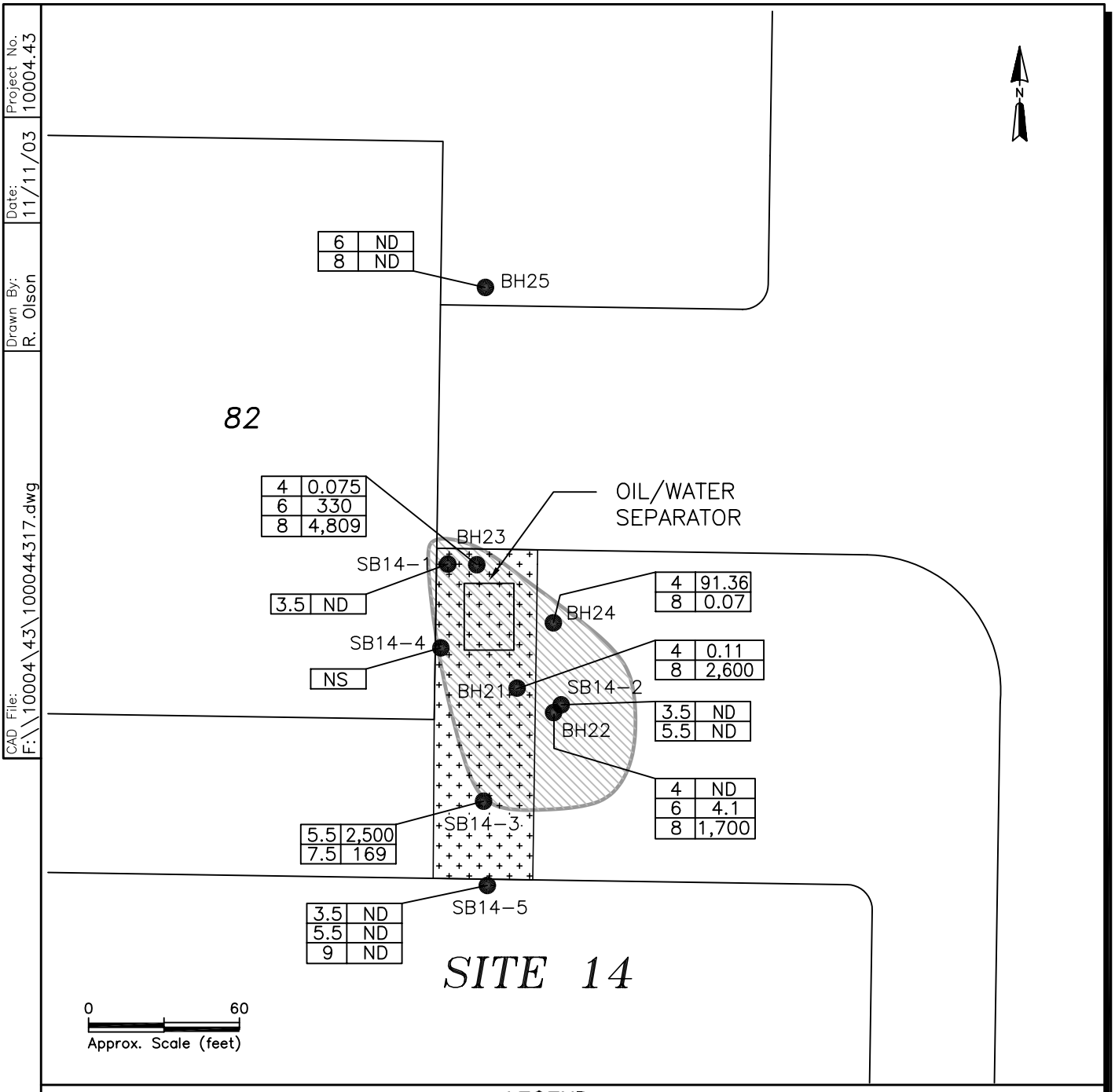
Total Organic Compounds and Total Semivolatile Organic Compounds in Soil

Site 14

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03



LEGEND

BH6 ● Soil Boring Location, Site Investigation

SB5–2 ● Soil Boring Location, Remedial Investigation

Original ERP Site

Suspected Area of Contamination From GSM Survey

Depth, Feet Below Ground Level

4	0.11
8	2,600

Concentration in milligrams per kilogram

ND Not Detected

NS Not Sampled

Figure 7-4

Total Petroleum Hydrocarbons in Soil

Site 14

152nd Airlift Wing, NVANG

Reno, Nevada

ERM 11/03